

# THE MEDICAL JOURNAL OF AUSTRALIA

VOL. II.—28TH YEAR.

SYDNEY, SATURDAY, OCTOBER 11, 1941.

No. 15.

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### An Address.<sup>1</sup>

By R. JOHN VERCO,  
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I COULD have selected any subject for what I expected to be my swansong, that would offer sufficient humour or interest, either scientific or historical, to hold your attention; but I fear I have been inconsiderate enough to choose one which you may well consider as dry as dust.

I am asking you to speculate with me upon the provision of a general medical service for Australia. My excuse is that this subject appears to me to be pressing and intimately bound up with the future of every member of this Branch of the British Medical Association. I shall neither harrow your feelings with suggestion of what trials and tribulations may confront you, nor entice you to gaze on a future rosy with a beautiful dream of reconstruction from within the profession itself, but endeavour to keep within the humdrum but practical boundary of the present state and the immediate future of the medical profession in Australia.

I hope to tickle your ears first with soothing words, by commending and defending your past and present efforts to provide a reasonably efficient medical service for the community in which you live and work. There appears to be a growing tendency in some quarters to belittle and deride whatever may have been done in the past towards providing such a service. Minds of this trend seem to have floating about within them some vague and hazy ideas loosely connected with an ideal state of medical

service that is somehow to materialize suddenly in that "Brave New World" which their intuition presumably tells them will follow immediately upon the cessation of the present world-wide hostilities. With such tiresome details as how this ideal state is to be brought about they have neither the time nor the inclination to grapple. They prefer their ideas to be nicely fluffy and nebulous; they prefer what they are pleased to call broad fundamental generalizations to cold hard facts. All that has been painfully and laboriously built up in the past by doctors, nurses and hospital and health authorities they seem quite prepared to discard scornfully for something different, because it will be new and better, since they argue that the weaknesses and inadequacies of the past system can be avoided in the new. It does not occur to them, in spite of all the lessons available by a contemplation of the past, that these new systems will inevitably develop weak and pernicious tendencies which will have to be sought out and eradicated as civilization staggers on painfully and laboriously into the mists of the future, just as it has done from the dawn of time until now. Blood, sweat and tears seem to be the ultimate coin with which man must purchase his social advances, so surely there must be something worth salvaging out of a system built up over centuries—something to perpetuate as well as something to avoid.

What is precisely the present state of medical service as it occurs with practically an open market for its sale to the community? Let us consider how it meets the needs of the public before we pass on to something presumably brighter and better. First, the members of the community, from the extremely wealthy down to the merely comfortably off—in fact, all those who are solvent and whose financial position is stabilized—can purchase an infinite variety of medical service, and they do all eventually find that medical service which is satisfactory

<sup>1</sup> Delivered at the annual meeting of the South Australian Branch of the British Medical Association on June 26, 1941.

to them in its scope and its price. Secondly, below these more fortunate sections of the people lies an immense army of those whose economic position is adequate for all the ordinary needs of life and for some of their medical requirements; but the amount available for the purchase of medical service is not large. Some of them insure themselves against excessive medical expense by joining medical benevolent societies, which also protect them to a limited extent from the loss of wages on account of sickness. When their own means and their lodge service fail, they apply to public institutions to make up any inadequacy. Thirdly, below this class again are the improvident and the indigent—those unfitted for the battle of life by deformity and disease of the mind, body and soul—the “can’t pay” and the “won’t pay”. Who looks after all these unfortunates? General practitioners, honorary medical officers to hospitals and free public institutions.

Non-paying patients mean a loss to the general practitioner of perhaps 20% of his bookings. He accepts this loss fairly cheerfully as his share in the work of looking after the non-paying sections of the community. On the other hand, the honorary medical officer to a hospital loses a far greater proportion of his available working hours. Herein, to my mind, lies the equitable basis on which rests the difference of fees for private patients charged by general practitioners compared with those charged by hospital “honoraries” and specialists. The latter class lose more of their working hours, but are compensated by a higher fee for private work. Their patients are adequately recompensed in the “honoraries” up-to-the-minute knowledge and wider experience. This is a loose and perhaps slipshod system, which, however, works quite well and allows variations to meet individual cases.

Medical service is also provided for the far distant country areas by the aerial medical services. Even the aboriginal and half-caste receive shelter and treatment at outback mission stations, such as Ernabella. So that throughout the immense territory of South Australia it can be stated that everyone in the community, whatever his financial position, whatever his location, whatever his colour or race, can and does obtain the medical service that he requires. This, I claim on your behalf, is no mean achievement. Then why alter things? Wherein lies the need for sweeping changes? What is to replace all this elaborate system? We have seen in THE MEDICAL JOURNAL OF AUSTRALIA various opinions expressed about the present state of the medical profession, some not very flattering, and various remedies recommended, some not very convincing. Probably all this cry of “new lamps for old” can be gathered under the idea that a victorious democracy will emerge from the tribulations of war, so refined by the fire of adversity and so conscious of its just rewards, that it will demand an improved medical service for the people of Australia and that this service will be freely available to all who require it. Geoffrey Crowther, editor of *The Economist*, writing on “A Future for Democracy”, has made the following statement:

Hitler is not the only one who cannot afford to stand still. Indeed he can possibly afford it better than we can. If he can only hold what he has, he has raw material for decades of triumph. But we must either submit to being pushed aside or we must reconquer the world for democracy. And to do so we must demonstrate that democracy can be as active and dynamic a creed as any which the Nazis possess. We must satisfy the craving of the ordinary man to be given not merely a set of intellectual doctrines, but a burning faith that will remove mountains. The citizen of democracy should be guaranteed not only his political liberties, but also the economic minimum without which the pursuit of happiness is merely an empty phrase. In this acceptance of a Bill of Human Rights, the individual would be guaranteed by virtue of his citizenship a certain minimum of food, clothing, decent shelter. He would be assured of a sufficiency even if he failed through any of the accidents of life, such as unemployment, old age or injury, to be able to earn his own living. Whatever his economic standing he would have access to full and careful medical attention.

I emphasize the last sentence. There you have the idea clearly set out that an efficient and comprehensive medical service, and even one free to all, must be provided,

because democracy, if it is to establish itself as a potent political force, must demand and provide it for the future democratic citizen. In short, when the present mess is cleaned up, democracy will demand of you a better and freer health service for its citizens.

There are certain basal commodities of life to which the democratic citizen is considered to have a just claim—for example, clothes, food, shelter, health. In view of the fact that, of all these basal commodities, the one you provide, namely, medical service, is to be especially singled out for the democratic ax, you may well ask “What is democracy?”—as ponderous a question as Pilate’s “What is truth?” propounded 2,000 years ago, and still awaiting a complete reply. In Australia today democracy and democratic ideals are sonorous words, which all and sundry use as a decorative cloak for their own particular political ideals. One well-known labour leader considers that democracy means “cutting down the tall poppies”, and would like you to ride in his democratic tumbrel to the parliamentary guillotine, which will shear off not your heads but your professional rights and privileges. Another will invite you to share the sublime struggle of the so-called workers towards life, liberty and happiness. The former Prime Minister of the Commonwealth will create for you yet another democratic ideal, which may more nearly mirror your own, embracing equality of sacrifice and service as well as equality of opportunity *et cetera*. All these are democratic ideals and all have a quite distinct flavour, and democracy will demand these sacrifices of you, though none can settle exactly what democracy means.

Democracy may mean to you equality of opportunity, freedom to speak and publish the truth, safety of individual rights and all the other virtues you hope for; but it may signify a quite separate set of conditions for others. Therefore a politically impotent minority, such as the medical profession, should think well in advance what sacrifices it is prepared to make, what it will accept, and what it will irrevocably reject.

Our present system might be improved by freer expenditure of public funds and greater effort by the medical profession; but it seems generally agreed that we have come to the end of an era which is considered inadequate for modern requirements. What, then, is to take its place? Some would-be reformers cannot endure the thought of parliamentary interference. Two schemes have recently been put before the profession in THE MEDICAL JOURNAL OF AUSTRALIA, the object of which is to effect immediate reconstruction of the medical profession voluntarily from within, so as to anticipate and nullify any threat of political intervention. Both entail the surrender of our right to collect private professional fees and the acceptance instead either of a fixed annual salary or of a return of so much per 1,000 individuals cared for.

Dr. S. Boyd wishes us to supervise the lives of our patients from birth onwards, and so to make use of preventive medicine that disease will disappear, except for a small unpreventable residue that will trouble no one. He suggests that we should see the newly born child and its mother once a month for the first twelve months. At one time I used always to attend 200 confinements a year; that would have given me an average of about 4,800 of these monthly examinations *per annum*.

Dr. A. E. Brown advises the closing of the medical schools to all except an estimated necessary number of hand-picked men, who will undergo suitable training to enter a medical service in which progression is by stereotyped stages, and in which advancement is possible solely by merit, length of service and experience. Rather a difficult problem in a democratic country; but perhaps Dr. Brown is a democratic totalitarian.

Both of these schemes contain an arresting central idea, which has been carefully elaborated. Neither of these planners makes any attempt to bridge the immense gulf that lies yawning between our present and their future. Here, as usual, you have the beautiful, fatally easy outline, but no final detail of administration and finance. Until practical details are worked out, plans remain pipe dreams from which we can at most borrow ideas for application within some concrete plan. Lions in the path of all

schemes of voluntary reconstruction from within are the following considerations: (i) The majority of medical practitioners would probably refuse to agree to exchange the present collection of professional fees in favour of work on the basis of a fixed salary *per annum*. (ii) They would probably refuse to submit to stabilization and fixation of prices. (iii) Really to serve the community, participation in a medical service must be universal, at least up to a predetermined wage level. This cannot be achieved without compulsion both of the medical profession and of the public. This coercion can emanate only from a parliamentary control by act of parliament.

New Zealand, as part of its social security scheme, has tried to institute a general medical service with completely voluntary participation on both sides. So far it seems to be a complete failure; I think it was doomed to be, on account of absence of universality of application up to a determined wage level. On the other hand, I understand that the part of the *Social Security Act* which applies to maternity and hospital benefits is working quite well and smoothly.

So finally we come back to two alternatives: eliminate as far as possible the faults and weaknesses of the present system or submit to some government scheme, such as national health insurance. Sir Frederick Stewart repeatedly threatens us with a recrudescence of his *National Health and Pensions Insurance Act*, and a Labour government in power would not be outdone by the present government in offering social service. Labour would probably seek to place the whole burden of payments upon industry and consolidated revenue. That would look like something for nothing to the average elector, and might be a popular and effective election cry for Labour. Therefore, I feel that our immediate preoccupation should be to decide on a model scheme for a general medical service. Let us make up our minds what it should offer the general public, how it is to be administered, and what we are to be paid for our services. Regulations under the act will set out what the panel doctor must render in service; but the act and whatever rights and privileges it and the regulations under the act grant, will be the only effective charter of the rights of the panel doctor. Last year the Federal Council of the British Medical Association in Australia, with an anxious eye on the future, forwarded to the Branch councils a scheme for a general medical service for Australia, and asked for criticism and constructive proposals. The scheme is introduced by the following preamble.

This Association submits for the consideration of the public a coherent and inclusive scheme of medical services, based on a few simple basic principles. The plan of the medical provision which the Association advocates is one that would ensure for all who need it, every kind of treatment available for the care of the sick and the prevention of disease, and would utilize for this purpose every class of medical practitioner.

The scheme sets out just what should be the scope and the nature of the service considered necessary. It deals freely with administrative and practical details, but on one of the crucial problems—the problem of finance—it is up to the present silent. What funds should be needed for such a scheme, how they should be raised, how they should be spent, and, above all, what would be a fair and just basis for determining the remuneration of the panel doctor—on all these points, at present, it preserves an impenetrable silence. Somehow, and at some not too distant date, all these general principles must be transmuted into their ultimate financial and administrative details, because finally this scheme will have to be used as an accepted basis for bargaining with some minister of health on behalf of the medical profession in reference to conditions of service and remuneration.

All these matters may seem to you to have only a remote importance at present. They do seem to pale into insignificance in face of the life and death struggle in which the British Empire is now locked. Once hostilities cease we shall have large numbers of medical men discharged from the Army, Navy and Air Force to civil life, from both home and foreign service. A considerable proportion of them will have little knowledge either of private practice or of their probable financial

requirements; the greater their professional and financial difficulties, the more likely they are to clutch at the proverbial drowning man's straw. That straw may well be service under a national health insurance scheme.

One of our major obligations to these men will be to ensure that the straw they grasp at will be sufficiently bulky to keep them afloat financially. There lies a fair field of action for the brains and the energy of the medical profession, and it appears a definite obligation and duty for those who remain in practice in Australia to do all in their power to safeguard the interests and the professional future in Australia of all medical men who have enlisted.

#### OBSERVATIONS ON THE EFFECT OF TREATING SPORES OF *BACILLUS SUBTILIS* IN PERCHLOR-ETHYLENE UNDER VARIOUS CONDITIONS; AND ON A NEW METHOD OF STERILIZING SURGICAL CATGUT.

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##### PART I: BACTERIOLOGICAL ASPECTS.

THE dissatisfaction with most chemical methods of sterilizing catgut expressed by Bulloch<sup>(1)</sup> after investigation of many processes, has again directed world-wide attention to this important problem. Bulloch advocated the use of aqueous iodine; but if about 40 feet of gut are wound firmly on reels as advocated, the outer layers absorb the iodine and the inner layers often are not coloured at all. Bulloch stated that Kronig's method of heating the catgut in cumol was uniformly satisfactory. Clock<sup>(2)(3)(4)(5)(6)</sup> has also advocated sterilization by heat, but he did not state the method to which he referred. He said that there were so many difficulties in neutralizing chemicals and so many sources of error in the technique that all chemical methods should be abandoned. He proved that the iodine method was not reliable if efficient neutralizing solutions were used before tests for sterility were made.

Clock has investigated many chemical methods recommended for sterilizing catgut, and has also examined many thousands of so-called "sterile" sutures from foreign as well as from American sources. He first tested each batch for the nature and amount of the chemicals present and then evolved the following three solutions for neutralizing them: (i) A solution of sodium carbonate and sodium thiosulphate, of each 1%, in distilled water, which will remove the usual chemicals found in tubing fluids (and with which catgut may be impregnated) if they are not present in too great an amount. This is the only solution recommended under the *British Therapeutic Substances Act* regulations. (ii) A 10% solution of sodium thiosulphate in distilled water, if chemical analysis shows that the sutures contain more than 2% of a mercury compound or more than 5% of iodine. It appears that iodine is taken up by catgut with avidity—up to 20% or 30% of the weight of the ligatures, dependent upon the strength and volume of the solution. The major part of this iodine is simply adsorbed and can be removed by washing in various solutions; ligatures soaked in 0.60% iodine solution containing potassium iodate for nine or ten days, followed by two or three changes of alcohol (70%) (with 10% glycerol) to remove the major portion of the adsorbed iodine, were found by Bulloch still to contain about 14% iodine; and he stated that treatment of a ligature for eight or nine days in such a way that it absorbed 12% of its weight of iodine ensured sterility. Thus it appears from Clock's work that when catgut prepared by the iodine method of Bulloch is being tested for sterility, a 1% solution is not to be relied on, and that a 10% solution of sodium thiosulphate should be used to avoid a false result. (iii) Ammonium chloride, 5%, in distilled water, with 0.5% ammonium hydroxide, as a preliminary neutralizing solution if copper salts even in



small amounts are present. The 10% sodium thiosulphate solution will not remove them.

All this handling complicates the tests and introduces risks of infection. Clock recommended a technique for the bacteriological test subsequent to neutralization of any chemicals found, and his technique has been adopted as a standard in the United States Pharmacopeia under the title "Tests for the Sterility of Solids".

It must be admitted that an overwhelming case for heat sterilization has been made out by Clock, who stated that those brands of foreign gut which for the most part yielded no growth on attempted culture, possessed certain physical properties characteristic of heat-sterilized gut. Also, in his studies of the chemical sterilization of catgut, each experiment was controlled by the subjection to heat sterilization of a duplicate set of sutures that had been treated with the particular chemical being investigated. In every instance the heat-sterilized sutures came through tests with entire absence of growth.

One such method—heating in cumol—is approved by Bulloch. This method of Kronig involves some handling of the sterilized catgut subsequent to heating—first, in the washing out of the cumol with chloroform, and then in the removal of the chloroform with alcohol, each having been obtained in a sterile condition. The catgut is then stored in alcohol for "non-boilable" tubes or in toluol for "boilable" tubes. Supplies of cumol are difficult to obtain in Australia, and after inquiring for a suitable anhydrous fluid of high boiling point in which to heat catgut artificially infected with a resistant sporing bacillus, I was advised by Dr. W. A. Klages to investigate the possibilities of perchlorethylene, which is used locally in industry, and of which supplies are readily obtainable.

Perchlorethylene is a fluid having a boiling point of 119° C.; it is soluble in alcohol, evaporates at room temperature, leaving no residue, and is an excellent solvent for organic substances, such as fats, oils, resin and other matter present in catgut; it is indifferent to metals in the presence of heat or water, or both, and is stable in the presence of moisture. It is an anhydrous fluid formed by the combination of acetylene and chlorine.

It was intended to heat the spores of *Bacillus subtilis* in perchlorethylene to such a degree that death resulted, and to apply if possible the principle to the sterilization of catgut. As preliminary steps it was necessary to show that this did not harm catgut or the tissues in which it was to be used, and to see whether perchlorethylene had an antiseptic action on the spores. *Bacillus subtilis* is a common contaminating organism in this type of work, and I hoped that if and when attempts at culture failed to produce a growth of *Bacillus subtilis*, a satisfactory technique would have been evolved. These spores will resist boiling for hours, whereas those of *Bacillus anthracis* are killed in ten minutes (in water). The strain used in these experiments was obtained from the McMaster Animal Health Laboratory, University of Sydney, by courtesy of Dr. H. R. Carne, and subcultures were made on agar from time to time.

The aim was to find out whether spores of *Bacillus subtilis* could be killed in any reasonable time by exposure to perchlorethylene, (a) at atmospheric pressure and room temperature, (b) at atmospheric pressure and a temperature about the boiling point of water, (c) at atmospheric pressure and a temperature about the boiling point of perchlorethylene, and (d) at increased temperatures and pressures.

Topley and Wilson<sup>(7)</sup> state that spores are more resistant in a protein than in a non-protein medium, and that spores heated but not killed require longer to germinate than unheated spores. Meleney and Chatfield<sup>(8)</sup> pointed out that spores might survive if they were in the centre of the catgut, where they might not come in contact with an effective degree of heat or with an efficient concentration of antiseptic for a sufficient period of time; they obtained growth as late as the thirteenth day of culture, and recommended observation for 15 days. Therefore it follows that more heat, pressure and time may be required to kill spores when they are wrapped in catgut, which may be a bad conductor of heat, than when they are exposed on string; and because heat prolongs the period

of dormancy of spores, very long observation will be required before it can be said that the spores have been killed. Burke<sup>(9)</sup> heated spores of *Bacillus botulinum* and found that some germinated as long after as 426 days. Her spores, heated and inoculated, developed in 201 days in sealed agar tubes, in 214 days in sealed broth tubes, and in 426 days in sealed broth oil-stratified tubes.

It was decided to carry out observations for 500 days. Previous experiments had shown that the heating of spores on string to 117° C. for one hour prolonged the period of dormancy for as long as 56 days; and in an earlier paper I<sup>(10)</sup> first pointed out that the standard test for the sterility of catgut as laid down by the *British Therapeutic Substances Act* regulations was not satisfactory when viewed in the light of more recent work by Clock and Burke. Burke's work made it obvious that the regulation period of 12 days was not sufficient, and Clock had recommended 15 days as a minimum. Now it seems that at least 426 days is the minimum time of observation before any method can be said to be worth considering for the sterilization of catgut.

Table II shows that heating at 20 pounds' pressure and a temperature of 153° C. maintained for fifteen minutes will not kill the spores on string; but the same heat maintained for thirty minutes (all four tubes being free from growth for at least 142 days) seemed more likely to be of use in practice than heat at 147° C. maintained for forty-five minutes with 15 pounds' pressure, for after this process one tube out of four yielded a growth of *Bacillus subtilis* in 14 days; the shorter the time, the more useful the method, other things being equal, since so much time is saved. It was therefore decided to carry out the remaining experiments at 20 pounds' pressure, and to begin with a period of thirty minutes because fifteen minutes had proved useless with string; further, number 2 catgut was to be used instead of string. The technique was the same as before.

#### Experiments with Catgut Size Number 2 (Plain).

Ten pieces of catgut were used in each experiment and each was incubated in a separate tube. The results, shown in Table III, indicate that number 2 catgut (plain) heated at 153° C. under 20 pounds' pressure was apparently sterilized after 40, 45, 55, 60, 65, 70 and 75 minutes. After thirty minutes' heating, six tubes yielded a growth of *Bacillus subtilis* in two days and two tubes in three days; the other two were discarded. After thirty-five minutes' heating one tube yielded a growth of *Staphylococcus albus* in one day and also one of *Bacillus subtilis* in two days. In the remaining nine tubes *Bacillus subtilis* grew in two days. After 50 minutes' heating one tube yielded *Bacillus subtilis* in three days and two tubes in four days, and a fourth tube grew a mould in 195 days, 27 days after the third lot of broth had been added to the agar slopes. The remaining six tubes remained sterile for 500 days. Of the other 50 pieces of catgut (heated for 55, 60, 65, 70 and 75 minutes), only one yielded *Bacillus subtilis*; that tube had been heated for sixty-five minutes and was cracked on the sixty-eighth day during flaming prior to the addition of broth, but it did not yield *Bacillus subtilis* till the one-hundred-and-fortieth day, four days after the second addition of broth. It is almost certain that this was an accidental infection. Another 14 of these tubes produced moulds or staphylococci. I felt that the tube which cracked should have been discarded, but was tempted to allow events to take their course and see what happened.

It was considered possible that the growth in three tubes after fifty minutes' heating was due to accidental infection; therefore this experiment was repeated, 20 pieces of catgut being used instead of 10. (a) Ten pieces were put through the solutions and then incubated. One produced *Bacillus subtilis* in two days. (b) Ten pieces were placed directly into the tubes, to minimize handling. One tube produced *Bacillus subtilis* in four days. The remaining 18 tubes remained sterile for 60 days, when observation ceased. Thus it seems that a period of fifty minutes is not sufficient to kill these spores. Table III shows that heating in perchlorethylene to 153° C. for a period of fifty-five minutes or more at 20 pounds' pressure will apparently kill spores of *Bacillus subtilis* inside plain catgut (number 2).



As each batch of tubes reached the five-hundredth day, two of the sterile tubes were infected with a loopful of *Bacillus subtilis* suspension and incubated. In each case a profuse growth of *Bacillus subtilis* occurred in twenty-four hours, showing that the medium was still favourable for its growth. It could reasonably be argued that the spores might survive in chromicized gut or in thicker plain gut; therefore the experiment was repeated with catgut made from infected plain ribbons and from ribbons chromicized in the wet stage, then infected, and twisted into plain catgut, number 6, and number 4 chromicized gut. This was cut into lengths of one inch, and 50 pieces of each were heated for fifty-five minutes, put through the three solutions, dropped onto the agar slopes and incubated. After 500 days' incubation not one produced *Bacillus subtilis*, though many produced moulds. Of tubes containing plain gut, ten (20%) were sterile; and of the tubes containing chromicized gut, 15 (30%) were sterile also after 500 days' incubation.

#### Technique.

1. Twenty-four hour agar slope cultures of *Bacillus subtilis* showing spores were used at first, till some variation in resistance of spores was noted; thereafter from four-day cultures a thick suspension of organisms in sterile distilled water was used to infect the material. A suspension of a twenty-four hour culture was used to infect pieces of sterilized string for certain early experiments, and the four-day culture was used on catgut as well as on string. The catgut was infected in the ribbon stage of manufacture, after having been soaked in peroxide of hydrogen for twenty-four hours, a process which sterilizes it. Under full aseptic precautions the gut was twisted, dried, cut into lengths of one inch and stored in a sterile glass jar.

2. All glassware, vessels, solutions and the boiler were autoclaved for thirty minutes at 20 pounds' steam pressure. The alcohol used was that supplied for ordinary hospital operating theatre work—that is, 90% alcohol containing 2% methanol. The 1% sodium carbonate and 1% sodium thiosulphate neutralizing solution recommended by Bulloch was used for the later experiments on general principles, and because at the time I was unaware of Clock's more recent work. The alcohol was to remove the bulk of the perchlorethylene from the material before it was placed in the neutralizing solution. Distilled water was finally used to wash out as much of the remaining chemicals as possible. The possibility that perchlorethylene might prevent growth was ruled out by experiment.

3. The media used were ordinary nutrient agar and nutrient broth; later on, agar slopes immersed in broth standardized to pH 7.6 were used when it was expected that cultures would need to be kept under observation for long periods. About five cubic centimetres of broth were added to the slopes from time to time to keep them moist. All tubes were incubated for four days before use to detect any accidental infection during their preparation.

4. The standard of growth was the presence in a smear of Gram-positive spore-bearing bacilli resembling *Bacillus subtilis*. Other organisms were found as contaminants—for example, staphylococci, diphtheroids and moulds.

5. The standard of sterility was the absence of growth on the slopes or in the broth after certain periods of observation.

6. Control experiments were carried out. Pieces of untreated infected material were put through tests identical with those given to the material which had been treated. On incubation all produced a growth of *Bacillus subtilis* in twenty-four hours. Two of the tubes finally yielding no growth were inoculated with a loopful of suspension and incubated. All produced *Bacillus subtilis* readily, showing that the medium was still favourable for growth of the test organism.

7. Cultures were observed daily for one month, then at least once a fortnight for the rest of the time; but more often weekly observations were made.

#### Experiments at Atmospheric Pressure and Room Temperature.

1. To determine whether perchlorethylene in the medium could inhibit the growth of *Bacillus subtilis* on agar or in broth, pieces of string infected with a one-day culture were soaked in perchlorethylene and dropped into three tubes of broth and onto three slopes, no attempt being made to remove the perchlorethylene. Growth occurred in all the tubes in twenty-four hours and on the slopes in 2, 3 and 5 days. A control tube yielded a growth of *Bacillus subtilis* in twenty-four hours. This indicated some

degree of inhibition of growth on agar, whereas in broth the perchlorethylene formed a separate layer at the bottom of the tube and did not delay growth. Even the addition of 25% by volume of perchlorethylene allowed growth in twenty-four hours.

2. To determine whether perchlorethylene had any anti-septic action on spores of *Bacillus subtilis* at room temperature and atmospheric pressure, pieces of string infected with a one-day culture were soaked in perchlorethylene for periods of from one to eighty days; then in lots of three they were washed in alcohol, in 1% sodium thiosulphate with 1% sodium carbonate solution, and finally in water (at each stage being incubated for twenty-four hours at 37° C.), and then transferred to tubes of broth and incubated. In every experiment growth occurred in all three tubes in twenty-four hours, showing that perchlorethylene had no disinfective action in 80 days.

#### Experiments at Atmospheric Pressure and a Temperature of Approximately 100° C.

A glass jar containing perchlorethylene was heated on a water bath till its temperature was 98° C.; 21 pieces of string infected with a one-day culture were then dropped into it, and this heat was applied for one hour on three successive days. Three pieces were removed after the first heating, eight after the second and ten after the third. Cultures were made in broth after the string had been washed for twenty-four hours in 1% sodium thiosulphate and 1% sodium carbonate solution, and finally in distilled water. (a) After one heating one tube yielded a growth in twenty-four hours and two tubes in forty-eight hours; (b) after two heatings all eight tubes yielded a growth in twenty-four hours; (c) after three heatings all ten tubes yielded a growth in twenty-four hours. Thus heating to 98° C. at atmospheric pressure in perchlorethylene did not kill spores of *Bacillus subtilis* after three heatings for one hour on three successive days.

#### Experiments at Atmospheric Pressure and a Temperature of 117° C.

The boiling point of perchlorethylene is approximately 119° C. Pieces of string infected with a one-day culture were heated in perchlorethylene at 117° C. on an oil bath for one hour, and some had this process repeated the next day. (a) After the first heating four pieces were removed and transferred directly to broth without any attempt to remove the perchlorethylene. Growth occurred in all four tubes in 3, 6, 6 and 7 days respectively; and in a control tube unheated string yielded a growth of *Bacillus subtilis* in twenty-four hours. (b) After the second heating eight pieces were transferred directly to broth as before, and again growth occurred in all tubes, in 10, 28, 29, 36, 36, 44, 44 and 56 days. An untreated piece of string yielded a growth of *Bacillus subtilis* in twenty-four hours. (c) The remaining seven pieces, which had been given their second heating at 117° C. for one hour, were transferred to sterile water for twenty-four hours, then to sodium thiosulphate solution for twenty-four hours, and finally incubated in broth. Growth occurred in all seven tubes, in 17, 20, 25, 34, 35, 40 and 48 days. Thus attempted removal of perchlorethylene did not materially affect the result, the shortest time being 17 days, as against 10 days where no such attempt was made. The heating of spores of *Bacillus subtilis* at 117° C. for one hour on two successive days at atmospheric pressure did not kill them. It did, however, delay the growth or prolong the period of dormancy, much more so after two heatings than one—a maximum of 56 days compared with 7 days. This might have led to an erroneous conclusion but for the fact that cultures were kept for a longer period than that usually advocated. Moreover, considerable variation in resistance of spores was apparent when a one-day culture was used for infecting the string.

In view of this it was decided to make future suspensions from a four-day culture, and to use instead of broth agar standardized to pH 7.6 with some broth added to the tube to keep the slopes from drying too quickly; these slopes with broth were used instead of ordinary

broth to give fully aerobic conditions for the germination of surviving spores. Because of the failure to kill the spores in a reasonable time at atmospheric pressure it was decided to heat them in perchlorethylene under various pressures; further, to eliminate the possibility that perchlorethylene might delay growth, all string or catgut used in future experiments was, after being heated, washed for twenty-four hours in alcohol, then for twenty-four hours in 1% sodium thiosulphate and 1% sodium carbonate solution, and finally in distilled water for twenty-four hours before being placed on agar slopes bathed in broth. At every stage the treated material was kept in an incubator at 37° C. All this, of course, increased the risk of accidental infection.

#### Experiments at Various Pressures and Temperatures.

The pressure-heating was carried out by the conversion of an aluminium steam pressure cooker, known as the "National Pressure Cooker", into a suitable apparatus. It was designed for cooking food under pressure in steam. The pressure gauge registered up to 20 pounds, and it was provided with a safety valve and screw-type control valve. The pressure gauge was checked against standard pressures, and correction was found necessary. In the experiments the corrected pressures were read on the gauge so as to obtain the equivalent temperatures for the true pressures produced. A thermometer pocket made of copper was fitted into the lid and extended four inches into the interior when the lid was in place. It was filled with heavy motor oil and a thermometer was inserted; the temperature of the vapour above the perchlorethylene was thus registered, and this temperature was taken as being the temperature of the fluid below and of its contents (string or catgut), which were immersed directly in it and uniformly heated by the convection currents set up in the fluid. The scope of the investigation was limited by the fact that the gauge registered up to 20 pounds only. The results are shown in Table I.

Preliminary experiments were carried out with pieces of string infected with a suspension of spores from a four-day culture of *Bacillus subtilis* on agar. String was used to find the range of temperatures likely to kill the spores,

TABLE I.  
Showing the Equivalent Temperatures Produced by Heating Perchlorethylene under Various Pressures.

Gauge Pressure in Pounds.	True Pressure in Pounds.	Equivalent Temperature.
0	0	119.0° C.
4.4	5.0	129.5° C.
9.4	10.0	139.0° C.
14.4	15.0	147.0° C.
19.6	20.0	153.0° C.

because the catgut was limited in quantity and therefore kept for the final tests. To remove the air and water the lid was screwed down and the temperature was raised to 119° C. till perchlorethylene vapour escaped from the valve for two minutes; then the control valve was closed and heating was carried out for the various times at selected temperatures and pressures. The results are shown in Table II; they indicate that a temperature of 139° C. for one hour or of 147° C. for three-quarters of an hour or of 153° C. for one-quarter of an hour will not kill these spores on string.

#### Conclusion.

It can be stated truly that number 6 plain catgut and number 4 chromicized catgut which has been heavily infected in the ribbon stage, before being twisted, with a suspension of four days old spores of *Bacillus subtilis*, can be sterilized by being heated in perchlorethylene for fifty-five minutes under 20 pounds pressure at a temperature of 153° C. Of 110 pieces thus treated, none produced the test organism on attempted culture, though during 500 days' incubation many produced moulds, two produced diphtheroids, and two produced *Staphylococcus albus*; 32 tubes (29%) remained sterile. It is interesting to note that a lower temperature and a shorter time will kill the same spores on string, where they are not protected.

TABLE II.  
Showing the Results of Heating Spores of *Bacillus subtilis* on String under Pressure in Perchlorethylene.<sup>1</sup>

True Pressure (Pounds.)	Equivalent Temperature.	Time in Minutes.	Results in Numbered Tubes.			
			1	2	3	4
20	153° C.	60	Mould 163 days.	Mould 163 days.	Nil 182 days.	Mould 134 days.
		45	Nil 191 days.	Nil 191 days.	Mould 138 days.	Mould 121 days.
		30	Mould 150 days.	Mould 145 days.	Mould 142 days.	Mould 153 days.
		15	<i>Bacillus subtilis</i> 2 days.	<i>Bacillus subtilis</i> 2 days.	<i>Bacillus subtilis</i> 3 days.	Mould 161 days.
15	147° C.	60	Mould 141 days.	Mould 134 days.	Mould 126 days.	Mould 110 days.
		45	<i>Bacillus subtilis</i> 14 days.	Mould 134 days.	Mould 143 days.	Mould 129 days.
		30	Mould 134 days.	Nil 181 days.	Nil 181 days.	Nil 181 days.
		15	<i>Bacillus subtilis</i> 1 day.	<i>Bacillus subtilis</i> 1 day.	<i>Bacillus subtilis</i> 1 day.	<i>Bacillus subtilis</i> 1 day.
10	139° C.	60	<i>Bacillus subtilis</i> 2 days.	<i>Bacillus subtilis</i> 2 days.	<i>Bacillus subtilis</i> 3 days.	<i>Bacillus subtilis</i> 6 days.
		45	Not tested in view of the above results.			
		30	Not tested in view of the above results.			
		15	Not tested in view of the above results.			

<sup>1</sup> The number of days elapsing from the inoculation of the tube till the growth of *Bacillus subtilis* or a mould or till observation ceased is given in each case. Broth was added to the slope from time to time to keep the agar partly covered.

TABLE III.

Showing Results of Heating Spores of *Bacillus subtilis* in Number 2 Plain Catgut under Twenty Pounds Pressure at 153° C. for Various Periods.

Minutes of Heating.	Tube Number.										Days on which Broth was Added.
	1	2	3	4	5	6	7	8	9	10	
30	3 days. +	3 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	—	Abandoned 2 days.	Nil.
35	2 days. S.	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	2 days. +	Nil.
40	495 days. M.	463 days. M.	478 days. M.	366 days. M.	—	—	106 days. M.	29 days. M.	478 days. M.	—	60, 135, 203, 269, 363, 463.
45	381 days. M.	441 days. M.	—	381 days. M.	487 days. M.	—	450 days. M.	376 days. M.	117 days. D.	450 days. M.	24, 98, 166, 232, 326, 426.
50	195 days. M.	4 days. +	3 days. +	—	—	—	—	—	4 days. +	—	26, 100, 168, 234, 328, 428.
55	355 days. M.	—	—	—	392 days. M.	—	339 days. M.	—	—	—	34, 108, 176, 242, 336, 436.
60	—	451 days. S.	—	—	—	—	—	—	—	—	54, 108, 176, 242, 336, 436.
65	—	—	315 days. S.	411 days. M.	—	—	Cracked tube + 140 days.	112 days. M.	327 days. M.	—	66, 136, 202, 296, 396.
70	—	—	—	—	—	—	—	—	—	—	65, 135, 201, 295, 395.
75	—	259 days. M.	426 days. M.	409 days. M.	—	318 days. M.	440 days. M.	—	—	426 days. D.	64, 134, 200, 294, 394.

+ Indicates growth of *Bacillus subtilis*.

— Indicates tube remained sterile for 500 days.

M. indicates mould first appeared in tube.

S. or D. indicates staphylococcus or diphtheroid appeared.

TABLE IV.

Showing the Effect of Heating Spores of *Bacillus subtilis* inside Plain Number 6 Catgut under Twenty Pounds' Pressure at 153° C. for Fifty-five Minutes.

Number of Tube.	Organism Grown.	Day on which Growth First Appeared.	Day after Last Addition of Broth when Growth was Noted.	Days when Broth was Added to Slopes.
1	Mould.	90	10	80
2	Mould.	140	60	80
3, 4	Mould.	174	94	80
5	Mould.	186	106	80
6, 7, 8, 9, 10	Mould.	274	76	80, 198, 274
11, 12, 13, 14, 15	Mould.	289	15	80, 198, 274
16, 17, 18, 19	Mould.	306	32	80, 198, 274
20	Mould.	313	39	80, 198, 274
21 to 29	Mould.	320	46	80, 198, 274
30, 31, 32, 33	Mould.	327	53	80, 193, 274
34	Mould.	369	23	80, 198, 274, 346
35, 36, 37, 38	Mould.	376	30	80, 198, 274, 346
39	Mould.	390	44	80, 198, 274, 346
40	Mould.	435	89	80, 198, 274, 346
41 to 50 <sup>1</sup> (inclusive)	Remained sterile.			80, 198, 274, 346, 459

<sup>1</sup> Two tubes inoculated with suspension as controls grew *Bacillus subtilis* in twenty-four hours. Thus ten tubes (20%) remained sterile after 500 days' incubation.

## Addendum.

It has since been shown by Professor Ward<sup>(3)</sup> that a large quantity of catgut thus treated on a commercial scale is not always sterilized, and that a certain strain of *Bacillus mesentericus* survives subjection to heat in perchlorethylene at 153° C. for four hours at 20 pounds' pressure, and even subjection to a temperature of 160° C. for two and a half hours at 25 pounds' pressure. No other organism survived. But catgut heated to 160° C. at 25 pounds' pressure for four hours has been found to be sterile always. Thus it appears that at least one strain of *Bacillus mesentericus* is more resistant than *Bacillus subtilis*.

Therefore one would advocate in commercial practice that catgut should be sterilized by being heated in perchlorethylene to 160° C. at 25 pounds' pressure for at least four hours, because this is certain and depends on heat alone. No antiseptic action occurs; the perchlor-

TABLE V.

Showing the Effect of Heating Spores of *Bacillus subtilis* inside Chromicized Catgut (Number 4) under Twenty Pounds' Pressure at 153° C. for Fifty-five Minutes.

Number of Tube.	Organism Grown.	Day on which Growth First Appeared.	Day after Last Addition of Broth when Growth was Noted.	Days when Broth was Added to Slopes.
1	Diphtheroid.	30	None added.	None added.
2	Diphtheroid and <i>Staphylococcus albus</i> .	39	None added.	None added.
3, 4	Mould.	90	10	80
5, 6, 7	Mould.	140	60	80
8	Mould.	160	80	80
9, 10, 11	Mould.	174	94	80
12	Mould.	186	106	80
13 to 17	Mould.	198	118	80
18, 19, 20	Mould and <i>Staphylococcus albus</i> (20).	289	15	80, 198, 274
21, 22, 23	Mould.	327	53	80, 198, 274
24 to 27	Mould.	335	61	80, 198, 274
28	Mould.	345	71	80, 198, 274
29, 30	Mould.	355	81	80, 198, 274
31 to 35	Nil; had become dry; discarded on 457th day.			80, 198, 274, 341
36 to 50 inclusive	Remained sterile.			80, 198, 274, 346, 459

<sup>1</sup> Two tubes inoculated with suspension as controls grew *Bacillus subtilis* in twenty-four hours. Thus fifteen tubes (30%) remained sterile under favourable conditions for growth after 500 days' incubation.

ethylene does not interfere with sterility tests; it does not require removal as it evaporates, and no subsequent handling is necessary. Thus the risk of infecting the sterilized catgut is avoided. As will be shown in Part II, no damage is done to the catgut or to the tissues in which it is used.

## Application in Practice.

The method as applied commercially consists in winding the catgut into the various packings, such as coils, balls, tubes or reels, and placing these in their glass containers,



which have been sterilized by being heated to 180° C. for thirty minutes in an oven. The caps of these containers are fitted with rubber disks to make them spirit-tight, sterilized by steam pressure and stored in an antiseptic solution. The glass vessels containing the catgut are placed in a special drying apparatus in wire frames and treated till all moisture has been removed. This is a most important step, because the slightest trace of water ruins the gut when heated, and even infinitesimal quantities spoil the breaking strength. The frames are then removed to the sterilizer containing the perchlorethylene, and the temperature is raised to 160° C. for four hours, the pressure required being 25 pounds. The frames are then taken out, turned upside-down to drain out the perchlorethylene, and stored upside-down in a glass enclosure, inside which are the sterilized caps in an antiseptic solution and a vessel containing alcohol sterilized by filtration. A worker's hands encased in sterile rubber gloves are passed into the enclosure through a sliding door, which is then closed. The vessels are filled with alcohol and the caps are screwed on. The panel is transparent, the worker's vision is clear, and no infection from outside can occur while the vessels are being filled. When all is completed the sealed vessels containing the catgut are removed and packed into boxes.

#### PART II: BIOLOGICAL ASPECTS.

It was necessary to prove that the treatment described in Part I did not impair the physical qualities of catgut as a surgical ligature, render it harmful to the tissues or affect its absorption time. The catgut used was of a standard quality which complied with the United States Navy Department specifications of June 1, 1931, as regards size, flexibility, breaking strength, ash content (upon which the absorption time seems to depend), and sterilization method. The last must be a heating method; the gut must also be placed in tubes with 95% alcohol as the tubing fluid. The minimum breaking strength is specified for the various sizes, both with a straight pull and over a surgeon's knot tied round a piece of rubber tube one-eighth of an inch in diameter. It is well known that the breaking strength of catgut is greater when tested straight than when knotted; but as the latter is of more importance, being less, the tests were carried out with the knot. The breaking strength in my experiments was always above the specified minimum.

The ash content must not exceed 0.7% in plain gut that has been dried at 60° C. for thirty minutes; further, no sulphates should be present. In twenty-day chromicized gut a maximum of 0.6% chromic oxide is allowed as well, making a total ash content of 1.30%; but there should be no unreduced chromium compounds after incineration for thirty minutes in a platinum dish at 1,200° F. in an electric furnace. The catgut used complied with these standards and was of standard diameters.

It was noted that the elasticity was not impaired by heating, though no actual measurements were made to record the amount of stretching before breaking occurred. There is no United States standard for elasticity. There is unfortunately no British standard for any physical or chemical quality of catgut.

#### Breaking Strength.

The gut was heated in perchlorethylene to 160° C. for four hours at 25 pounds' pressure, allowed to dry, and stored in 95% alcohol for two months before the tests, so as to comply with ordinary working conditions. The alcohol was standardized to a pH of 7.6, as this is the optimum. Five-foot lengths of plain (ten-day) and chromicized (twenty-day) catgut were taken and tied round one-eighth inch rubber tubing in double reef knots, and the breaking strength was recorded for numbers 1, 2, 3 and 4. It appears that heating and storing tend to increase the breaking strength in most instances with both types of catgut; it was below standard in only one test. Three tests were made for each size, and the results (averaged) are shown in Table VI.

#### Absorption Time and Tissue Reaction.

It was decided to study the tissue reactions produced by implanting into the *rectus abdominis* muscles of guinea-pigs pieces of heated plain gut (number 2) which had been allowed to dry by evaporation and not stored in any solution. In the muscles of the opposite side pieces sterilized in Bulloch's iodine solution and stored in 90% alcoholic solution of biniodide of mercury (1 in 250) with glycerine (2%) (the Royal Hospital for Women standard storage solution) were placed for comparison. Four guinea-pigs were anesthetized by the intraperitoneal injection of "Dial", the dose being 0.5 cubic centimetre per kilogram of body weight.

One guinea-pig was found dead on the third day. The wound had suppurated and the animal had died during

TABLE VI.

Diameter in Inches.	Size and Type of Gut.	Breaking Strength in Pounds with Double Reef Knot.		U.S. Navy Department Standard Minimum Breaking Strength with Double Knot. (Pounds.)
		Heated and Stored in 95% Alcohol for Two Months.	Dry.	
0.015 to 0.018	Number 1 plain.	10.0 } 10.0 } 10.0 }	7.5 } 10.5 } 9.0 }	7.0
		10.0 }	9.0 }	
0.018 to 0.021	Number 1 chromicized.	8.0 } 11.0 } 11.0 }	7.5 } 9.0 } 8.0 }	7.0
		10.0 }	8.1 }	
0.018 to 0.021	Number 2 plain.	10.0 } 11.0 } 10.0 }	11.5 } 12.5 } 12.0 }	9.1
		10.3 }	12.0 }	
0.018 to 0.021	Number 2 chromicized.	11.0 } 9.0 } 9.0 }	10.5 } 10.0 } 11.0 }	9.1
		9.6 }	10.5 }	
0.021 to 0.024	Number 3 plain.	16.5 } 16.5 } 12.5 }	12.5 } 13.0 } 12.0 }	11.2
		15.2 }	12.5 }	
0.021 to 0.024	Number 3 chromicized.	12.0 } 15.0 } 12.5 }	14.0 } 12.0 } 12.5 }	11.2
		13.2 }	12.8 }	
0.024 to 0.027	Number 4 plain.	14.5 } 13.0 } 17.0 }	19.0 } 17.0 } 14.0 }	14.0
		14.8 }	16.7 }	
0.024 to 0.027	Number 4 chromicized.	17.5 } 16.5 } 16.0 }	16.0 } 15.5 } 16.5 }	14.0
		16.6 }	16.0 }	

the week-end, as it was rigid and foul on the Monday. The others were killed on the second, eighth and twenty-first days; the tissues containing the gut were excised and placed in "F.A.A." fixative for twenty-four hours and then in 70% alcohol. "F.A.A." is a mixture of formalin (100 cubic centimetres), acetic acid (60 cubic centimetres), alcohol (440 cubic centimetres), and distilled water (500 cubic centimetres). Another set of four guinea-pigs were similarly treated, and another animal died in similar circumstances. The remaining guinea-pigs were killed on the second, eighth and twenty-first days. Microscopic slides were prepared and a report was made in the department of pathology at the University of Sydney, by Dr. A. J. Canny. There was no undue tissue reaction to catgut sterilized by heat in perchlorethylene and implanted dry, when compared with catgut sterilized by the aqueous iodine method and stored in a commonly used solution. The pathological reports are as follows:

A. Catgut in the tissues for two days. (a) Sterilized by heat and implanted dry: the catgut has been penetrated by several groups of inflammatory cells, among which polymorphonuclear cells are conspicuous; most of these cells within the catgut are degenerate. (b) Sterilized by Bulloch's method and stored in a 1 in 250 solution of biniodide of mercury: the catgut has moved from its position; this area shows very slight cellular infiltration of the surrounding tissues, and there is no change in the catgut beyond a doubtful penetration in one small area at the periphery by a few polymorphonuclear cells, which are now degenerate.

B. Catgut in the tissues for eight days. (a) Sterilized by heat and implanted dry: the surrounding tissues show only a very slight cellular reaction, though more advanced than in the two-day slides; the catgut shows no invasion, but is surrounded by a zone of fibrocellular connective tissue, in which a few inflammatory cells are present. No giant cells were seen. (b) Sterilized by Bulloch's method and stored in a 1 in 250 solution of biniodide of mercury: the surrounding tissues show more advanced changes; the catgut is surrounded by a similar but more advanced reaction, and there is slight infiltration by polymorphonuclear cells.

C. Catgut in the tissues for twenty-one days. (a) Sterilized by heat and implanted dry: there is invasion of the catgut by wandering cells of various types, a few foreign body giant cells and some very young granulation tissue; surrounding the remnants of the gut is a zone of fibrocellular connective tissue rather deeper than that of preceding sections. (b) Sterilized by Bulloch's method and stored in a 1 in 250 alcoholic solution of biniodide of mercury: slight invasion of the catgut by polymorphonuclear cells and histiocytes is seen; the surrounding connective tissue zone is moderately dense, but of fibrocellular nature.

Thus it can be claimed that catgut heated in perchlorethylene does not act as a tissue irritant. There appeared to be less pronounced invasion of the catgut stored in alcoholic mercury biniodide solution.

To compare the reaction with plain and chromicized gut, heat-sterilized and stored in two different solutions—(a) alcoholic biniodide of mercury (1 in 250) with 2% glycerine added, and (b) 95% alcohol containing 0.1% iodine—a third set of guinea-pigs was used. Into each guinea-pig there were implanted anteriorly the following test materials: (a) one piece of plain gut (number 2) stored in 95% alcohol with a 0.01% solution of iodine, on the right side; (b) one piece stored in 1 in 250 alcoholic biniodide of mercury solution with 2% glycerine added, on the left side; and posteriorly, two pieces of number 2 chromicized gut, similarly stored and grouped with regard to right and left sides. The peritoneum of two guinea-pigs was accidentally opened, which may explain the deaths in previous experiments; one of these pigs died in twenty-four hours. The others were killed on the second, eighth, twenty-first, twenty-third and twenty-eighth days. The chromicized gut was twenty-day gut, and it was desired to see whether absorption had begun or not in twenty-one days and to what extent it had proceeded by the twenty-eighth day. The tissues were prepared as before. The report on the sections is as follows:

A. Catgut in the tissues for two days. Plain. (a) Stored in a 0.1% solution of iodine in 95% alcohol: slight infiltration of the surrounding tissues is seen with wandering cells, of which the majority are lymphocytes and polymorphonuclear cells; a few histiocytes are also present. There are no changes in the catgut. (b) Stored in a 1 in 250 solution of biniodide of mercury in 90% alcohol: this area shows

very slight cellular infiltration of the surrounding tissues, slightly more marked than in the section from catgut stored in 0.1% strength iodine. There are no changes in the catgut except for a doubtful penetration in one small area at the periphery by a few polymorphonuclear cells, which are now degenerate. Chromicized catgut stored in (a) iodine and (b) mercury biniodide solution: the appearances are much the same as in the two previous sections. There is no invasion of the catgut.

B. Catgut in the tissues for eight days. Plain. (a) Stored in 0.1% iodine solution: the surrounding tissues show more advanced changes than in the two-day sections. The catgut itself shows no invasion, but is surrounded by a zone of fibrocellular connective tissue in which a few inflammatory cells are present. No giant cells are seen. (b) Stored in 1 in 250 mercury biniodide solution: the changes are similar to those in the catgut stored in iodine solution. Chromicized catgut. (a) Stored in 0.1% iodine solution: the tissue reaction is similar to that in the previous section; but newly formed fibrocellular connective tissue is penetrating the surrounding muscles to a greater extent and some of the muscle fibres are atrophying. (b) Stored in 1 in 250 mercury biniodide solution: the changes are similar to those in the plain catgut stored in mercury biniodide; the catgut shows no invasion.

C. Catgut in the tissues for twenty-one days. Plain. (a) Stored in 0.1% iodine solution: there is a moderate degree of invasion of the catgut in several places both by polymorphonuclear cells and by histiocytes; a narrow zone of fibrocellular connective tissue, of more mature type than that seen in the eight-day sections, surrounds the catgut. (b) Stored in 1 in 250 mercury biniodide solution: the gut shows a slight infiltration chiefly by polymorphonuclear cells and it is surrounded by a narrow zone of moderately mature fibrocellular connective tissue in which polymorphonuclear cells are conspicuous. Chromicized catgut. (a) Stored in 0.1% iodine solution: the connective tissue zone does not appear to be so dense as in the previous slide, and it contains a greater proportion of histiocytes. The gut is not affected. (b) Stored in 1 in 250 mercury biniodide solution: the connective tissue is rather more dense than in the "iodine" slide, and contains more polymorphonuclear cells.

D. Catgut in the tissues for twenty-three days. Plain. (a) and (b): the catgut seems to be disintegrating, and there are marked infiltration and destruction of the catgut both by histiocytes and by polymorphonuclear cells; the connective tissue surrounding the cellular zone is more mature than that seen in any previous section. Chromicized. (a) and (b): the connective tissue zone is moderately mature and contains a moderate number of polymorphonuclear cells and some histiocytes laden with blood pigment; there is no change in the catgut. Summary: plain gut shows considerable absorption in 23 days, and chromicized gut shows no absorption.

E. Catgut in the tissues for twenty-eight days. Plain. (a) Stored in 0.1% iodine solution: the catgut has almost completely disappeared; its situation is now occupied by a cellular mass composed of histiocytes, fibroblasts and a few phagocytic giant cells and a small number of polymorphonuclear cells. (b) Stored in 1 in 250 mercury biniodide solution: there is a surrounding zone of fibrocellular tissue in parts richly infiltrated by histiocytes, lymphocytes and polymorphonuclear cells. There is a slight degree of invasion of the gut by polymorphonuclear cells and a few histiocytes, which are now for the most part degenerate. Chromicized catgut. (a) Stored in 0.1% iodine solution: the surrounding zone of connective tissue is narrow and in parts contains large numbers of histiocytes, and a few polymorphonuclear cells are also present. There is no change in the catgut. (b) Stored in 1 in 250 mercury biniodide solution: the appearances are much the same as in the previous section: the connective tissue zone is a little thicker.

#### CONCLUSION.

1. It appears that a 1 in 250 biniodide of mercury solution may tend to delay absorption of catgut slightly when compared with a storage solution of 0.1% iodine in 95% alcohol.

2. To heat catgut in perchlorethylene does not cause it to act as a tissue irritant nor affect its absorption time. Chromicized gut may also be sterilized in this way and stored in either solution.

3. The chromicized gut used (twenty-day type) showed no commencement of absorption in twenty-eight days. It is supposed to resist absorption for at least twenty days; but I expected, rightly or wrongly, some change in twenty-eight days.

4. The physical quality of catgut heated as described to 160° C. is not adversely affected.

## ACKNOWLEDGEMENTS.

I am indebted to Dr. W. A. Klages for the suggestion to use perchlorethylene, and for equipment; to Professor W. K. Inglis for permission to use the department of pathology; to Professor H. K. Ward for advice and permission to use the department of bacteriology; to Dr. N. E. Goldsworthy and Dr. A. J. Canny for advice and assistance. I also acknowledge the assistance of their technical staffs, and of Mr. Freeman, of the pathological department of the Royal Hospital for Women, Paddington.

## REFERENCES.

- <sup>(1)</sup> W. Bulloch, L. H. Lampitt and J. H. Bushill: "The Preparation of Catgut for Surgical Use", Medical Research Council of the Privy Council, Special Report Series, Number 138, 1929.
- <sup>(2)</sup> R. O. Clock: "The Fallacy of Chemical Sterilisation of Surgical Catgut Sutures", *Surgery, Gynecology and Obstetrics*, Volume LVI, 1933, page 149.
- <sup>(3)</sup> R. O. Clock: "The Sterility of Surgical Catgut Sutures, with Special Reference to Foreign Made Catgut", *Surgery, Gynecology and Obstetrics*, Volume LX, 1934, page 899.
- <sup>(4)</sup> R. O. Clock: "The Present Status of the Sterility of Surgical Catgut Sutures, with Special Reference to American Made Gut", *Surgery, Gynecology and Obstetrics*, Volume LX, 1935, page 202.
- <sup>(5)</sup> R. O. Clock: "Fallacies Concerning Chemically Sterilized Surgical Catgut Sutures, with Special Reference to the Use of Metallic Silver", *Surgery, Gynecology and Obstetrics*, Volume LXIV, 1937, page 1027.
- <sup>(6)</sup> R. O. Clock: "A Reliable Method of Testing the Sterility of Surgical Catgut Sutures", *Surgery, Gynecology and Obstetrics*, Volume LXI, 1935, page 789.
- <sup>(7)</sup> W. W. C. Topley and G. S. Wilson: "Principles of Bacteriology and Immunity", Volume I.
- <sup>(8)</sup> F. L. Meleney and M. Chatfield: "How Can We Ensure the Sterility of Catgut?", *Surgery, Gynecology and Obstetrics*, January, 1936, page 271.
- <sup>(9)</sup> G. S. Burke: "Studies on the Thermal Death Times of Spores of Clostridium Botulinum", *The Journal of Infectious Diseases*, Volume XXXIII, 1923, page 274.
- <sup>(10)</sup> T. H. Small: "When is Catgut Sterile?" *THE MEDICAL JOURNAL OF AUSTRALIA*, Volume I, 1936, page 878.
- <sup>(11)</sup> H. K. Ward: Personal communication.

# THE MANAGEMENT OF THE POSTERIOR POSITION OF THE OCCIPUT IN RELATION TO THE SHAPE OF THE PELVIS.<sup>1</sup>

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So much has been written about the posterior position of the occiput that it seems almost impossible to present any fresh aspects of the problem. Before going further I should like to thank Dr. F. A. Bellingham for allowing me access to a summary of the histories of some 810 cases of occipito-posterior positions, which occurred at the Women's Hospital, Crown Street, between the years 1930 and 1935. Dr. Bellingham went through the actual histories, and by his diligent and careful work I have been saved much tiresome searching. Of these 810 cases I have rejected 30 owing to the association of twins or prematurity. A premature infant is defined as one weighing less than five and a half pounds.

The object of this paper cannot be achieved unless a few definite facts can be established. The first fact concerns the duration of labour when the occiput was in the posterior position at the commencement of labour. Among *primiparæ* delivered of a live baby, labour lasted for an average of thirty hours; among those whose babies were stillborn or died from causes attributable to the posterior position of the occiput, the average duration of labour was fifty-four hours, or one day longer than that of their more fortunate sisters who had a live baby to show for their efforts. The *multiparæ* had much the same story. Those who had a stillborn baby were thirty hours in labour, compared with fifteen hours of labour for the successful ones. The average weight of the stillborn

babies was eight pounds. Unfortunately, it has to be admitted that those mothers delivered of stillborn children had a much worse time and lost potentially healthy babies.

Writer after writer on this subject has naught to offer except conservatism and manual rotation, each correct when applied in the right type of case, but wrong when used without a proper understanding of its correct application. I shall discuss means by which we might reduce this loss of infant lives. Miller<sup>(2)</sup> gives us a guide to prognosis in his analysis of 750 cases of dystocia due to the posterior position of the occiput. In this series, which was taken from the records of the Edinburgh Royal Maternity Hospital, he came to the following conclusions: (i) when the membranes ruptured prematurely, 74% of the occipita failed to rotate; (ii) in those cases in which there was delay in engagement of the head, the occiput remained in the posterior position in 77%; (iii) when the foetal heart was heard, not only in the flank but in the opposite quadrant, pointing to an attitude of deflexion with the foetal chest thrust forward towards the mother's abdominal wall, then 76% of these occipita remained in the posterior position; (iv) if two of these abnormalities occurred together, such as early rupture of the membranes and slow engagement of the head, then the occiput remained in the posterior position in 80%. As a contrast to this, when the head engages normally and the membranes remain intact the occiput will favourably rotate in 90% of cases if time is allowed, and this is the group of cases in which conservatism is an advantage. Unfortunately we are expected to deal with the former group in which the occiput does not rotate, and Miller<sup>(2)</sup> gives the formidable foetal death rate of 22% for this type of case. Dawson, of New Zealand,<sup>(3)</sup> comments on this high figure, and reports a death rate of 5.2%; but Miller's figure probably includes a greater proportion of "emergency admissions".

Our own figure at the Women's Hospital shows that when the occiput remained in the posterior position or had to be manually rotated, the foetal death rate was 6.9%. This death rate, when taken into consideration with the lengthened labour, is a serious reflection on our methods of delivery. The group of patients with whom I am concerned are those who show signs that all is not progressing well, and by this I mean that descent and rotation are not taking place. Chassar Moir<sup>(4)</sup> has made the following statement: "I have no qualms in dealing with the uncomplicated posterior position, but I dread a narrowing of the lower pelvis or a contraction ring of the uterus." He goes on to state that the persistence of the posterior position of the occiput may merely be a token of this condition. Failure to rotate may be due to extension of the head by which the occiput fails to become the leading part, or favourable rotation may be prevented by the shape of the pelvis. This leads to the purpose of this paper, which is to show that a correlation between the shape of the pelvis and the proposed treatment is essential if the still-birth rate is to be lessened.

First comes the consideration of the shape of the child's head. It is to be noted that the average weight of the stillborn babies is in the vicinity of eight pounds, and if the diameters of those foetal skulls which fail to engage are measured, the biparietal diameter is frequently found to be enlarged; this in turn prevents the occiput from entering the pelvis in the flexed attitude. Therefore, even in a normal pelvis a true disproportion may be present to such an extent that the amount of moulding required would endanger the life of the baby. Accordingly, failure to enter the pelvis after a reasonable amount of labour may be due to the size of the baby's head rather than to its position; in other words, because the occiput is in the posterior position, disproportion cannot be ruled out.

We have next to consider the pelvis and its influence on the position of the occiput, and its effect on the site and manner of rotation. Before going further, let us consider the work of Caldwell, Moloy and D'Esopo. Whilst one admits the criticism that the shape of the pelvis is not the only cause of the posterior position of the occiput, since if this were so the same patient would always have

<sup>1</sup> Read at a meeting of the Section of Obstetrics and Gynaecology of the New South Wales Branch of the British Medical Association, 1940.



the fetus presenting in the occipito-posterior position, yet in my opinion the work of these three is not fully appreciated, nor are its principles showing the obvious influence of the shape of the pelvis on the mechanism of labour fully appreciated. You are all aware of Caldwell and Moloy's work in classifying the pelvis into four main types: (i) the gynecoid pelvis or female pelvis, essentially round in all directions; (ii) the android pelvis with its inward sloping walls, or, as it is sometimes termed, the funnel pelvis (this term is not quite true for the android pelvis, because it is not circular, being flattened in the posterior portion); (iii) the anthropoid pelvis, with its long antero-posterior diameter, functionally a good pelvis; (iv) the platypelloid or flat pelvis. This is their main classification; but no classification will ever cover all types of pelvis, and so we have various sub-classes, as the "gynecoid flat" and the "android flat", describing pelvises with characteristics of two classes. Caldwell and Moloy's technique is to view X-ray pictures in a stereoscope and to measure the pelvis according to the following set plan: (i) an analysis of the pelvic capacity from the inlet view; (ii) an analysis from the lateral aspect; (iii) an analysis from the front of the angle of the pubic arch and variation of the pubic rami. This examination takes into consideration the position and shape of the sacrum and the available space in the anterior and posterior segments of the pelvis. This is measured from a line in the coronal plane between the spines and the widest part of the inlet, and will vary according to the type of pelvis. It is the application of the knowledge gained by Caldwell and Moloy to practical obstetrics that will lead to a more scientific treatment of the posterior position of the occiput. Let us look at Figure I, showing an anthropoid pelvis with a good sacral curve. This is a

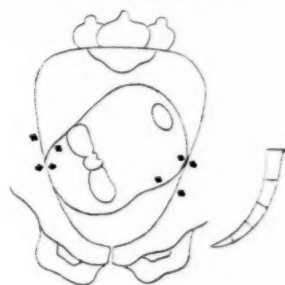


FIGURE I.

fairly efficient pelvis, but it does not favour rotation owing to its deviation from the circle. Unless the head is unduly large, it will, however, probably deliver itself anteriorly or as a persistent posterior position, and it can be seen that attempts to rotate it in the pelvis would only be fraught with disaster because of the lateral walls. The head should either be left alone altogether or rotated on the perineum; or if earlier delivery is decided upon for maternal or foetal reasons, the head must firstly be gently pushed up just sufficiently to allow rotation, and then rotated. Again, if this pelvis also had the android tendency of converging walls, to leave it alone would result in jamming as the larger diameters of the head came down. Therefore, a knowledge of this particular pelvis would influence us to the following decisions: (i) to leave the occiput alone; (ii) to rotate the head above the pelvic brim; (iii) to rotate the head on the perineum when it was free of the lateral walls; (iv) to interfere at an earlier stage if android tendencies were present, so as to avoid impaction of the head on the spines.

The next type of pelvis to consider is a platypelloid pelvis with a normally placed sacrum, as in Figure II. It is essential to recognize the presence of this abnormality, and here X-ray examination is helpful, although measurements are more likely to be of use with this type of pelvis than with the former; the small antero-posterior measurements and normal to increased transverse measurements give the key to the type of pelvis. The use of radiography before and during labour in suspected dystocia will

ultimately be found to be one of the greatest boons to the obstetrician. At this point I would stress the fact that it is the obstetrician's duty to familiarize himself with the interpretation of his films so that he can apply the best mechanics to the abnormality of the pelvis that he actually sees. Again, I stress the fact that only by full knowledge of the shape of the pelvis can the best mechanics be applied, and it is the lack of correct mechanics that keeps the stillbirth figure where it is.



FIGURE II.

To return to this type of pelvis: the occiput, if it is able to engage, will rotate to the transverse position, and unless the pelvis is large or, conversely, unless the baby is small, it must continue to descend in the transverse position till it is free of the anterior and posterior walls, and only then can it be rotated. This is the type of case in which attempts at rotation in the pelvis must meet with failure, and if the head is dislodged upwards and rotated no advantage will be gained, as it will still have to rotate in the pelvis back to the transverse position—a point missed by most textbooks. Therefore, the treatment is conservatism with rotation on the perineum, provided the pelvis has not also android characteristics. This will be discussed in connexion with Figure III.

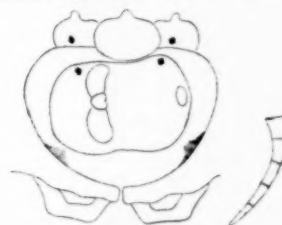


FIGURE III.

In the third type of case the pelvis is flat and the sacrum forward; the head will be slow to engage, and if the biparietal diameters are at all enlarged, in all probability the head will not enter the pelvis. Figure III illustrates a typical case; after good, strong labour of eight hours' duration the head failed to engage. A Caesarean section was performed with a happy result. Again, if the pelvis is flat and small or the child is large, and if the android characteristics of insloping walls are also associated, then the question of whether impaction will take place low in the pelvis must also be considered. Therefore, the treatment suggested in the presence of a flat pelvis is primarily Caesarean section, if there is failure to engage after a reasonable trial. If engagement takes place, allow the head to descend to the pelvic floor and rotate the occiput when it is free of the anterior and posterior walls. This type of case is very suitable for Kielland's forceps, by which the head can be brought down to the level at which it can be rotated. Here I would endeavour to stifle hostile criticism by saying that I am not an advocate for the use of Kielland's forceps in all cases of posterior position of the occiput, nor am I an advocate for any particular manoeuvre. Some prefer to rotate by hand, others by forceps, others again use different manoeuvres; but I am trying to show that each posterior position may want a different method. It is mechanically unsound to rotate the occiput in the mid-pelvis if the pelvis is of the flat type. I am not discussing the great majority of cases of posterior position of the occiput occurring in

normal pelves in which favourable progress is being made, but those in which this is not so, and I am endeavouring to suggest that, when possible, an X-ray examination should be made if progress is not what it should be, or preferably when trouble is expected. I also wish to stress the fact that when the patient is being delivered it is wrong to attempt to do the same thing each time, for the futility of pushing a head above the brim in a flat pelvis, in which it must rotate again to the transverse position if delivery is to be accomplished, is quite obvious, but never mentioned.

Figure IV illustrates the android type of pelvis. Caldwell and Moloy found that in 100 Caesarean sections for dystocia that were performed, 41% were associated with an android pelvis. Therefore, if there is a posterior position of the occiput associated with an android pelvis, we are in for trouble. Firstly, the flat posterior part of the pelvis prevents anterior rotation and the converging side walls make descent more difficult. The treatment, then, would be to dislodge the head and rotate it above the brim, and not to attempt rotation in the pelvis owing to the flat sacrum and the converging pelvic walls. Interference should be undertaken at an early stage so that the smaller diameters of the head may be given a chance to come through the decreasing diameters of the pelvis; otherwise it may become jammed, death of the fetus will take place, and only craniotomy will permit the delivery of the infant.

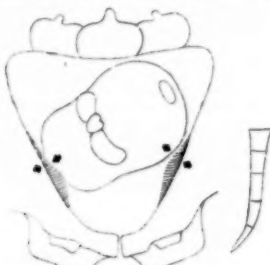


FIGURE IV.

## Summary.

1. In posterior position of the occiput, when the length of labour is much increased, the stillbirth rate is also higher.
2. Premonitory signs of failure of the head to rotate are noted in 75% of cases.
3. When failure of the head to rotate occurs, the fetal death rate is reported to vary from 5% to 22%.
4. Reduction of this figure can be obtained only by an appreciation of the mechanics required in each individual case.

## References.

- <sup>(1)</sup> D. Miller: "The Occipito-Posterior Case: Its Diagnosis and Management", *The British Medical Journal*, Volume 1, June 7, 1930, page 1036.
- <sup>(2)</sup> J. B. Dawson: "The Occipito-Posterior Position: A Review of 415 Cases", *The British Medical Journal*, Volume 1, April 13, 1940, page 612.
- <sup>(3)</sup> C. Moir: "The Occipito-Posterior Positions of the Vertex and their Complications", *The British Medical Journal*, Volume 11, September 10, 1938, page 556.

## A NOTE ON THE USE OF THE DE LAVAL SEPARATOR IN THE PREPARATION OF HUMAN SERUM.

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In the preparation of human serum for transfusion the yield obtainable by direct clotting of whole blood does not

<sup>1</sup>This work was done with the aid of a grant from the National Health and Medical Research Council.

exceed 45%, whereas if oxalated plasma is prepared and serum is prepared from this by the addition of calcium chloride, yields as high as 50% to 60% are regularly obtained. The removal of all the formed elements (including the blood platelets) from oxalated blood is best achieved by centrifugation; but in the handling of large quantities of blood the centrifuges necessary are expensive and difficult to obtain at the present time. The De Laval blood separator used in these experiments provides a relatively cheap and efficient substitute, and milk separators can easily be modified to yield similar results.

## The Separator.

The blood separator (Figure 1) consists of a rapidly revolving enclosed bowl, seen in section in Figure II, in which the blood is subjected to centrifugal force, a supply can A, a regulating cover B, which controls the delivery of the blood to the bowl, and two collecting covers (C and D) which are fitted with spouts through which the cells and plasma respectively pass into collecting vessels. The separator bowl is carried by a vertical spindle driven by an electric motor. The blood enters through the regulating cover at a and is spread into thin layers by a series of concentric conical disks. The cells are collected from the periphery of the disks and pass through the outlet c into the collecting cover C, while the plasma passes up a

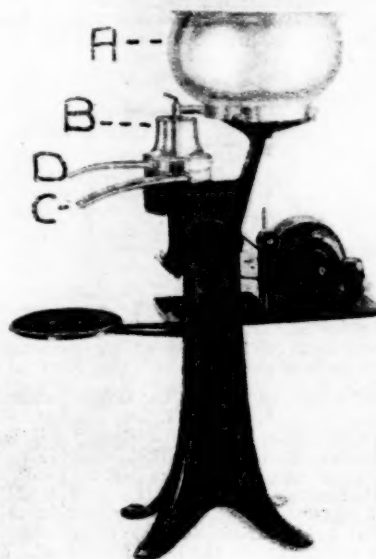


FIGURE I.

channel from the inner edge of the disks and is collected through the outlet d into the collecting cover D. The whole bowl can be taken to pieces for cleaning.

By slight modifications to the separator which make it a closed system, and by sterilization of the apparatus, plasma can be prepared aseptically. The open supply can A is discarded, and the blood, which has been collected into "Solvac" transfusion flasks containing potassium oxalate solution sufficient to make a 0.15% solution in the whole blood, is led through a muslin filter bag and two or three feet of gum rubber tubing to a small piece of glass tubing fitted tightly into the opening of the regulating cover B. One end of the glass tubing is drawn out to a fine jet and controls the rate of flow of blood into the bowl. A series of jets were made for trial and calibrated to deliver from 2.5 to 12 litres of blood per hour. The bore

of the smallest jet was slightly less than one millimetre. Two flasks were connected to the regulating jet by a Y piece, which enabled a series of flasks to be emptied in turn without interruption to the process. The spout on the collecting cover *D* was connected by a rubber tube with a suitable receptacle.

In the experiments reported here the "Soluvac" flasks, tubing and receiving apparatus were autoclaved and the covers and bowl of the separator were sterilized by being boiled or by immersion in one in 300 "Zephiran" solution for five minutes, followed by boiling in water for thirty minutes. The bowl is assembled prior to sterilization; but the locking nut which holds the disks in place is not

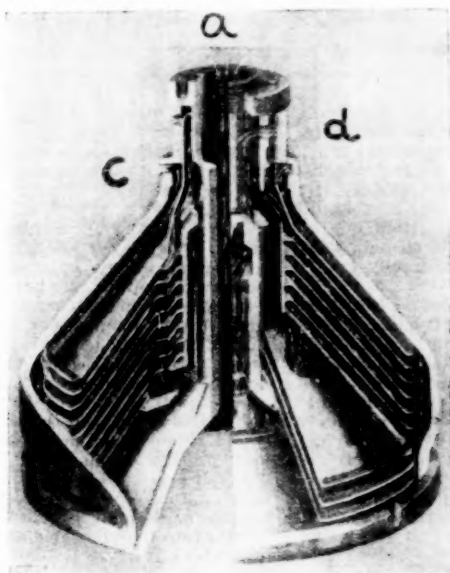


FIGURE II.

tightened till after sterilization, when the bowl is placed on the spindle. The collecting and regulating covers are then placed in position. Before the blood is run through the separator, all traces of water must be removed from the bowl, covers and tubing, especially if the apparatus has been sterilized by boiling. This can be done if the sterile saline solution is run from a flask through the apparatus after assembly. The bowl is filled with sterile saline solution before the blood is allowed to flow in.

A milk separator can be used instead of the special blood separator if the float which controls the entry of milk is removed and a narrow glass tube is fitted tightly into the opening of the cover.

#### The Yield of Plasma.

The separator used had a specified capacity of eight to twenty litres per hour. In preliminary experiments with dog's blood, the percentage yield of plasma was found to fall when the rate of flow was too rapid. A large pooled sample of blood yielded 59% of plasma at 6.8 litres per hour, 54% at 12.5 litres per hour and 33% at 30 litres per hour.

The experimental results summarized in Tables I and II indicate the yields of plasma from human blood, the figures in each table being obtained from the separation of seven samples of blood run through in succession; the apparatus was not cleaned or re-sterilized. The separation in Table I was carried out at four litres per hour and gave an average plasma yield of 55%; that in Table II was effected at three litres per hour, with a plasma yield of 60%. The total volume of blood in each of these experiments was over four litres, and if allowance is made for the addition of 125 cubic centimetres of saline solution in the bowl (half its total capacity), our calculated average yields are 3% too high.

The separation was not quite perfect in respect of blood cells. The number of red blood corpuscles per cubic millimetre in the plasma in Table I ranged from 770 to 885; in Table II the content of the pooled plasma was 580 red cells per cubic millimetre.

In an experiment with dog's blood separated at 5.5 litres per hour, the yield of plasma was 59%; it contained 4,500 red cells per cubic millimetre. The plasma yield of the same blood separated at 12.5 litres per hour was 63%. It contained 10,500 red blood cells per cubic millimetre.

#### The Effect of Admixture of Blood of Different Groups.

There is no hæmolysis when blood of different groups is passed through in succession, nor is there any interference with separation. For example, a series of freshly drawn samples of blood of groups A, B, O, A were separated in that order, and no trace of hæmolysis was observed in the pooled plasma. The free hæmoglobin in the plasma in Tables I and II depends upon the use of stored blood.

#### The Effect of Storage of Blood before Separating.

While it is advisable to separate the blood as soon as possible after it has been collected, it appears that satisfactory separation without hæmolysis can be obtained if blood is stored for as long as thirteen hours after collection. When blood is stored for twenty-eight hours or longer, increasing amounts of free hæmoglobin are found in the plasma (Tables I and II). The addition of glucose (to 1%) to the blood stored for seventy-two hours in Table I reduced the extent of hæmolysis; but its presence in blood stored for shorter periods had no appreciable influence.

The effect of pooling in the presence of the few red blood cells left in the plasma upon the titre of agglutinins is also shown in Tables I and II. The titres of agglutinins of the individual samples of plasma in Tables I and II were of about average height, and the pooled plasma shows the striking reduction which occurs on pooling.

TABLE I.  
Yields of Plasma from Human Blood.

Blood Group.	Serum Titre.	Age of Blood Before Separation. (Hours.)	Volume of Blood. (Cubic centimetres.)	Volume of Plasma. (Cubic centimetres.)	Yield of Plasma. (Percentage.)	Hæmoglobin. (Grammes per centum.)	Erythrocytes per Cubic Millimetre.	Remarks.
B	—	3	560	820	50	Nil	885	Total volume of blood, 4,090 cubic centimetres. Total volume of plasma, 2,255 cubic centimetres. Average yield, 55%. Protein content of pooled plasma, 8.0%.
O	$\alpha$ 1/20, B 1/20	3	680					
A	B 1/60	3	390					
O	$\alpha$ 1/80, B 1/80	48	620	165	60	0.14	770	Serum titre of pooled plasma, $\alpha = 1$ , B = $\frac{1}{4}$ .
A	B 1/40	48	600	210				
A	B 1/40	72	620	150				
A	B 1/40	72	620	205	58	0.80	—	
A	B 1/60	72	620	140				
			205	55				

<sup>1</sup> This blood contained 1% of glucose.



TABLE II.  
Yields of Plasma from Human Blood.

Blood Group.	Serum Titre.	Age Before Separation. (Hours.)	Volume of Blood. (Cubic centimetres.)	Volume of Plasma. (Cubic centimetres.)	Yield of Plasma. (Percentage.)	Hæmoglobin in Plasma. (Grammes per centum.)	Remarks.
B	$\alpha$ 1/80	28	630	350	56	0.09	Total volume of blood, 4,330 cubic centimetres.
A	—	29	630	350	56		Total volume of plasma, 2,600 cubic centimetres.
AB	—	30	620	400	65		Average yield, 60%.
A	B 1/40	7	625	220	63	Not detectable.	Protein content of pooled plasma, 7.4%.
O	$\alpha$ 1/80, B 1/10	7	620	215	62	Not detectable.	Erythrocyte count of pooled plasma, 580 per cubic millimetre. Titre of plasma, $\alpha$ = 1/16, B = 4.
O	$\alpha$ 1/40, B 1/20	13	600	175	58	Not detectable.	
A	B 1/20	13	605	175	58	Not detectable.	
				190	60		

(Jakobowicz and Bryce<sup>(1)</sup>). It might be anticipated that the presence of red cells of AB, A, and B would aid in reducing the titre of the pooled plasma; but the data are too incomplete to enable us to determine whether this played a part in the observed reduction.

#### Clinical Use of the Serum.

Serum prepared from the pooled plasma separated by this method was administered intravenously to five patients. In three instances the dose was 1.2 litres. Two of these patients were suffering from severe burns and showed striking clinical improvement; a third had general peritonitis with ileus, and though temporary improvement was observed, death resulted thirty-six hours later from a perforation of the stomach.

A patient who was suffering severely from shock after bowel resection for mesenteric thrombosis was given a dose of 200 cubic centimetres of serum three times concentrated by the "Cellophane" tube method; the systolic blood pressure rose from 80 millimetres to 100 millimetres of mercury. A further 0.6 litre of unconcentrated serum caused the blood pressure to rise to 120 millimetres of mercury. Unfortunately the thrombosis spread into the portal vein, and death occurred next day. A patient suffering from a compound depressed fracture of the skull and profound shock, whose systolic blood pressure was 70 millimetres of mercury, was given 300 cubic centimetres of twice concentrated serum (prepared by reconstitution of the dry material), with gradual improvement. The patient withstood operation next day and made a good recovery. In none of these instances was any unfavourable immediate reaction observed.

#### Reference.

(1) R. Jakobowicz and L. M. Bryce: "The Isoagglutinin Titre of Pooled Serum or Plasma", *THE MEDICAL JOURNAL OF AUSTRALIA*, March 15, 1941, page 318.

#### PATENCY OF THE DUCTUS ARTERIOSUS IN ADULTS.

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IN the development of the medical sciences the *ductus arteriosus* holds a peculiar position. Seldom has it occurred that an organ with a well-known embryonic development, anatomical structure and physiological function has frustrated all attempts to answer a few remaining questions. It is interesting to note how during the last hundred years renewed attempts to solve these problems have been made from time to time, and how after a few years all such zeal has abated until it was revived some twenty years later, only to abate again. It seems as if a new chapter in this varied history has now commenced. It is certainly significant that during last year's session of the American Medical Association the Radiological

Section devoted a whole morning's discussion to problems concerning the *ductus arteriosus*.

The problems are these: what mechanism is responsible for the closure and obliteration of the duct during the neo-natal period, and why does the duct remain patent in a number of cases? The beginning of this new chapter in the history of the duct is not marked by the discovery of facts hitherto unknown or by new suggestions which would directly lead to an answer to these questions, but by an attack on the problem from quite another angle. The theoretical questions have been shelved for the time being, it being taken for granted that amongst our patients a number with a patent duct will be found. However, the question is asked whether it is really necessary to leave these patients to their fate, which so often means death in early middle life.

Cases of patency of the *ductus arteriosus* have to be divided into two groups. In the first group the patent *ductus arteriosus* is a compensating mechanism for congenital malformations of the heart or the great vessels. In the second group no such malformation is present, and we are without any explanation for the patency of the duct.

The first group does not enter into the present discussion. In it the patent *ductus arteriosus* is of vital importance, and any interference with it would be not only unwarranted but certainly disastrous. The second group, however, is at present the focus of interest. Here it is solely the abnormal communication between the aortic and the pulmonary systems which, under certain conditions, leads to adverse consequences. A continuous shunting of blood from the aorta into the pulmonary artery will have a twofold effect: firstly, the blood supply to the periphery will be diminished; secondly, an excessive amount of blood will be circulating through the lungs. It has been claimed that such a diminished blood supply to the periphery may lead to a retardation of the general physical development of the patient. Reduction of the vital capacity and orthopnea are the results of the increase of the blood volume in the lung circulation. Adverse effects on the heart itself have to be expected when the work of the heart is continuously above the normal level. It has furthermore been shown that a *Streptococcus viridans* infection may be seriously aggravated by the presence of a patent *ductus arteriosus*. Maude Abbott<sup>(1)</sup> has published a series of 92 fatal cases of patent *ductus arteriosus* in which there were no other cardio-vascular abnormalities. Forty-three per centum of the patients died of sudden or slow cardiac failure, and 30% of *Streptococcus viridans* endocarditis or endarteritis of the pulmonary artery. Others have placed the incidence of such an infection at an even higher level.

On such lines, indications for a surgical ligation of the patent *ductus arteriosus* have been worked out by Hubbard, Emerson and Green,<sup>(2)</sup> and two years ago Gross and Hubbard<sup>(3)</sup> reported the first successful operation of this kind. Since then Gross<sup>(4)</sup> has performed a number of such operations and others have followed his lead. Although not all of these operations have been successful, they have certainly offered the possibility of checking at operation the results of careful clinical and radiological

examinations, and have made it possible to conduct studies by methods which previously could not be applied to human beings. It is in this way that new data become available from which conclusions towards the solution of the theoretical problems can be drawn. A first step in this direction has been made by Eppinger and Burwell.<sup>(5)</sup> They have arrived at interesting conclusions, but the findings in the case of a patient who has come under observation at this hospital confirm only part of their results, while contradicting others. Therefore, it seems justifiable to compare the findings in this case, and my interpretation, with Eppinger and Burwell's conclusions.

#### Report of a Case.

A woman, aged forty years, was admitted to this hospital complaining of pain in the left side of the abdomen and in the back. She had always had painful menstruation, but during the last twelve months the pain had continued throughout the intermenstrual period. She knew that she had congenital heart disease; her exercise tolerance had become poor in recent years, and she became breathless on slight exertion.

On examination some cyanosis was found to be present, the systolic blood pressure was 105 millimetres of mercury, the diastolic blood pressure 75 millimetres. The heart sounds at the mitral area were clear; there was a harsh, blowing, systolic and diastolic murmur at the tricuspid area, the systolic murmur being conducted to the aortic and pulmonary areas. The second sound was reduplicated at the pulmonary area. X-ray examination revealed a prominent left auricle and some enlargement of the right auricle. On vaginal examination an enlarged retroverted uterus was found.

As the patient was willing to undertake the risk of an operation, an operation for subtotal hysterectomy and bilateral salpingo-oophorectomy was performed. The pathological examination revealed fibromyomata of the uterus and an endometriosis of both ovaries. The patient died eight days after operation, with signs of circulatory failure.

At post-mortem examination the heart was found to be enlarged. This enlargement was mainly due to hypertrophy of the right ventricle. The thickness of its wall reached 20 millimetres. The left ventricle was about normal, the greatest thickness of its wall being 12 millimetres. All valves were intact and delicate; the *foramen ovale* was closed. The aorta was of normal width; a few lipid patches were seen in its intima. The pulmonary artery was considerably dilated, especially at its main stem and its two main branches before their entry into the lungs. In the intima of the pulmonary artery a great number of large atherosclerotic plaques were seen. They were partly atheromatous, partly calcified. In the major branches of the pulmonary artery similar patches were found, but these rapidly decreased in number towards the periphery. Connecting the aorta and the pulmonary artery was a patent *ductus arteriosus*. It was 7.5 millimetres wide and 8.0 millimetres long. Its wall was rigid and showed some calcification.

The lungs were congested. The middle and finer branches of the pulmonary artery showed neither atherosclerosis nor noticeable dilatation.

The spleen was of normal size. It contained an anæmic infarct, which involved nearly half the organ. Embolic material was found in the corresponding branch of the splenic artery. The gastro-intestinal tract showed no abnormalities. The liver was somewhat enlarged and pronounced venous congestion was present.

The field of operation in the pelvis showed no inflammatory reactions, but a thrombosis had developed in the left ovarian vein. The thrombosis extended throughout the whole length of the vessel into the main left renal vein, and in a retrograde direction into most of the veins within the kidney. Distended blood vessels could be seen in the capsule of the left kidney and the surrounding connective tissue. The right kidney was normal.

The findings in this case that have a direct bearing on the present discussion can be summarized as follows: enlargement and hypertrophy of the right ventricle, but not of the left; a patent *ductus arteriosus* of considerable width; gross dilatation and atherosclerosis of the pulmonary artery, most pronounced in the main stem and rapidly decreasing towards the periphery; paradoxical embolism from the renal vein through the duct into the spleen.

#### Comment.

The conclusions drawn by Eppinger and Burwell from the investigations of Gross's cases are as follows. Blood

is continuously shunted from the aorta into the pulmonary artery during systole as well as during diastole. The amount of blood shunted is reported to have been very large in their cases; 45% to 75% of the blood pumped out from the left ventricle is said to have been passed back through the *ductus arteriosus* short circuit into the pulmonary artery. This means that the left ventricle had to pump out two to three times as much blood as the right ventricle during the same period. They therefore expected to find amongst other signs a considerable enlargement of the left ventricle, and they report that they found it on X-ray examination in all but one of their cases. An enlargement of the left ventricle facilitating an increased output is, in their opinion, the main compensating mechanism, while the right ventricle is not seriously affected by this condition.

From a perusal of their paper the first impression is that the figures obtained for the amount of shunt are extraordinarily high. They give them as 3.9, 8.1 and 19.5 litres per minute for the three cases in which those measurements were taken. It seems doubtful whether the diameter of the duct would be sufficient to allow such large shunts. It is difficult to imagine that a patient would be able to sustain for a considerable length of time an overloading of the pulmonary system of such magnitude. Yet clinical observation shows that the majority of patients with a patent *ductus arteriosus* live up to thirty or forty years, some of them even reaching old age; for the greater part of this time they exhibit no symptoms or signs of a deranged circulation; they are able to carry out all the usual activities of life as well as normal persons.

A number of questions will therefore have to be asked and answered. The first is: are the methods by which these figures were obtained reliable beyond reasonable doubt? If this is so, are these figures valid perhaps only in the special circumstances under which they were obtained, while being unsuitable for general application in cases of patency of the duct? Has the body perhaps some other mechanism at its disposal which will provide some kind of compensation without allowing such a large shunt?

With regard to the first question, the method employed to measure the amount of shunt (the direct Flick method<sup>(6)</sup>) is generally considered to be the most reliable one, although it has so far been used only under experimental conditions on animals. This was the first occasion on which it could be so employed on the human. Nevertheless, there is no reason why it should not be reliable, as the general conditions (anaesthesia, surgical procedures) are practically the same both in man and in animals. The width of the duct is not an insurmountable obstacle, at least in two of their cases. When one assumes that the pressure in the aorta and in the pulmonary artery remains about normal—that is, about 150 millimetres of mercury in the aorta and 40 millimetres of mercury in the pulmonary artery—volumes of blood as in Eppinger and Burwell's first two cases may pass through the duct on account of the rapid fall of pressure over such a short distance. But amounts of about 20 litres, as in their third case, can be shunted only when the difference of pressure in the two systems is much greater than is compatible with any possible type of circulation, or when the duct has practically no length.

With regard to the results of the X-ray examinations, the skiagrams as published are not completely convincing. They undoubtedly show an increase in the transverse diameter of the heart, but the conclusion as to whether this is due to an enlargement of the left or the right ventricle cannot be drawn from an examination of Eppinger and Burwell's films, at least of those published. Even if methods and results obtained by these authors are correct, it remains to be seen whether these figures can be used as the basis for a general consideration of the circulatory mechanism in cases of patency of the duct, or whether there is evidence to the contrary. In the case reported above there was an enlargement of the right ventricle, but not of the left, as postulated by Eppinger and Burwell. Maude Abbott has seen in her cases hyper-

trophy of the right ventricle as well as of the left. C. Sternberg (1910),<sup>(7)</sup> in reviewing the older literature, has especially stressed the findings of an enlarged right ventricle.

If that actually is the usual response of the heart to patency of the duct, it suggests quite a different compensating mechanism—a mechanism which would permit the establishment of a far more normal circulation and would not lead to such an overloading of the pulmonary system. In order to see how such a mechanism could be developed, it is necessary to consider first the conditions in the ante-natal and neo-natal period. During ante-natal life the pressure in the pulmonary artery is higher than that in the aorta, and blood flows accordingly from the pulmonary artery into the aorta. In all the older literature, and even in a number of recent publications, the view is expressed that at the beginning of extrauterine life a sudden switch over from the ante-natal to the post-natal type of circulation occurs. Numerous, but often rather cumbersome, suggestions have been necessary to provide an explanation why blood should cease to flow through the duct immediately after birth, whilst for about a month the duct remains patent, although becoming narrower. The investigations of Patten<sup>(8)</sup> have shown that these views are incorrect. Already in the ante-natal period the lungs receive much more blood than was previously thought. In the neo-natal period there is a very gradual swing over from one type of circulation to the other. The pressure relations between aorta and pulmonary artery are not suddenly, but slowly, reversed.

When for some reason or other (this question will be discussed on another occasion) the duct does not close, the body will at this time already begin to develop a compensating mechanism. Whenever possible, the establishment and continuous increase of an arterio-venous shunt will not be tolerated. This can be achieved by preventing the reversal of the pressure relation between aorta and pulmonary artery—that is, by not permitting a dilatation of the vascular system of the lungs to accommodate two to three times the normal amount of blood, but by constricting the entrances to the capillary bed of the lungs and increasing the force of the right ventricle so that the pressure in the main stem of the pulmonary artery does not become much lower than the aortic pressure. This will prevent any considerable shunt or keep it at least at a tolerable level.

There is, I think, enough evidence to support such a suggestion. First of all, the fact that many patients with a widely patent duct are for many years quite unaware of their condition, indicates that a fairly normal circulation must have been established. In the clinical examination of such persons no signs of a significant shunt are found. There are no heart murmurs, and the exercise tolerance is good. The fact that at post-mortem examination hypertrophy of the right ventricle is commonly found has already been pointed out.

Other features of the case here reported lend further support to my suggestion of the type of compensating mechanism. The main stem and the two main branches of the pulmonary artery were found to be dilated, but not the medium or smaller branches within the lung; that is, the vessels with a mainly elastic wall had given way, but not those with a mainly muscular wall. Likewise, the distribution of the atheromatous changes, extensive in the main stem and rapidly decreasing towards the periphery, supports my suggestion.

Another point: Maude Abbott has described that in her large series of cases attacks of cyanosis have often been noticed. Within the range of our subject cyanosis indicates a venous-arterial shunt. It would be difficult to imagine what circumstances could lead to an increase of the pressure in the pulmonary system from about 40 to over 150 millimetres of mercury, which is necessary for a reversal of shunt under Eppinger and Burwell's assumptions; but little difficulty would be experienced in explaining slight increases of the pulmonary pressure necessary for such a shunt under my suggestions. That a shunt from the pulmonary into the aortic system occurs, at least on

occasions, is proved in the case reported here. The paradoxical embolism—renal vein, right side of heart, patent duct, spleen—is decisive evidence.

We shall therefore have to assume that the usual mechanism in patency of a duct is not free shunt (restricted only by the width of the duct) compensated by an increase of the output of the enlarged left ventricle, but hypertrophy of the right ventricle, elevation of the blood pressure in the main stem of the pulmonary artery until little or no shunt occurs. Two questions arise: firstly, how can such a suggestion be consistent with Eppinger and Burwell's actual observations? Secondly, in these circumstances, are the indications for surgical ligation of the duct still valid? The answer to the first question is that the patients who ask for medical advice are those in whom some degree of decompensation has developed. When the right ventricle begins to become unable to keep up the blood pressure in the pulmonary artery, shunt will occur and increase, and therefore more blood will have to pass through the lungs. Clinical symptoms and signs as described will become noticeable. In other words, conditions develop such as were actually observed by Eppinger and Burwell. Some further support for the assumption that the right ventricle is placed in the centre of the compensatory mechanism is afforded by the fact that patients with a patent duct generally die at an age at which other conditions placing undue strain on the right side of the heart usually terminate life.

With regard to the indications for surgery, they do not lose their significance if one supports the contentions here advanced; on the contrary, it seems possible to add another point for consideration.

Amongst these indications, the first one, retardation of the general development of the body due to diminished peripheral blood supply, would probably lose its importance, as when compensation has taken place the peripheral blood supply ought to be sufficient. Should retardation actually occur—evidence is not entirely conclusive in this direction—it might result from an attempt of the body to keep the aortic pressure as low as possible in order to facilitate an approximation of the pressure in both systems.

The second point, relief of the heart, is perhaps even more important under this assumption, because the strain on the right side of the heart is probably greater than on the left side of the heart according to Eppinger and Burwell's suggestions. The same holds true for the third point—the prevention of the establishment or spread of *Streptococcus viridans* infection. Such an infection might even be more easily established in a duct through which little or no blood flows than in one through which much blood flows at a high rate.

A fourth point, which has so far received hardly any attention, results from a consideration of the effect of the condition on the vessels themselves, especially the pulmonary artery. Its dilatation has been noticed in practically all cases, but this has been ascribed usually only to its increased filling. If my assumption is correct, this dilatation is to a large extent due to loss of elasticity of its wall, which is not built for withstanding high pressure for many years. The resulting atheroma will not only make the dilatation irreparable, but will pave the way for other complications, as for example the development of aneurysms. If, as in the case reported here, atheroma and calcification affect the duct, surgical ligation will become impossible or will render such an attempt fatal owing to hæmorrhage. The contention that surgical interference should not be unduly delayed receives additional support from this observation.

To establish as a fifth indication the prevention of a possibility of paradoxical embolism would be probably unwarranted, as such an occurrence is extremely rare. Thompson and Evans,<sup>(9)</sup> in reviewing the literature of paradoxical embolism, deal only with cases in which such an embolism has occurred through a patent *foramen ovale*, and do not mention any such occurrence through a patent *ductus arteriosus*.



### Conclusions.

The conclusions which have been drawn from the observations laid down in the literature, and in the case reported here, can be summarized as follows:

1. In cases of uncomplicated patency of the duct the body attempts to establish a circulation as normal as possible. This is done by equalization or approximation of the blood pressure in both the aortic and the pulmonary systems by means of a hypertrophy of the right ventricle and constriction of the medium and small lung arteries. Shunt and overloading of the pulmonary system are thus kept at a minimum.

2. In the course of time the right ventricle will fail under this heavy task, shunt will occur and increase, enlargement of the left ventricle and excessive circulation through the lungs will result. Finally, the left ventricle will also fail, and life will terminate under the signs of general failure of the circulation. Eppinger and Burwell's conclusions remain valid, but only for the circumstances in which they were obtained—that is, for the period of decompensation.

### Summary.

A new surgical procedure, admirably planned and performed at first by Gross, has given the opportunity to study the circulation in cases of patent *ductus arteriosus* by methods hitherto not applicable.

The conclusions drawn by Eppinger and Burwell from such studies are contradicted in part by findings in a case in which death resulted from a patent *ductus arteriosus* and by a number of statements in the literature. An explanation for these contradictions is offered on the basis of another mechanism of circulation, and the indications for surgical treatment of a patent *ductus arteriosus* are reviewed in the light of this explanation.

### References.

- (1) M. Abbott: "Atlas of Congenital Heart Disease", 1936.
- (2) F. P. Hubbard, P. V. Emerson and H. Green: "Indications for Surgical Ligation of Patent Ductus Arteriosus", *The New England Journal of Medicine*, Volume CCXXI, September 28, 1939, page 481.
- (3) R. E. Gross and F. P. Hubbard: "Surgical Ligation of a Patent Ductus Arteriosus: Report of First Successful Case", *The Journal of the American Medical Association*, Volume CXII, February 25, 1939, page 729.
- (4) R. E. Gross: "Experiences with Surgical Treatment in Ten Cases of Patent Ductus Arteriosus", *The Journal of the American Medical Association*, Volume CXV, October 12, 1940, page 1257.
- (5) E. C. Eppinger and C. S. Burwell: "The Mechanical Effects of Patent Ductus Arteriosus on the Heart and their Relation to the X-Ray Signs", *The Journal of the American Medical Association*, Volume CXV, October 12, 1940, page 1262.
- (6) C. S. Burwell, E. C. Eppinger and R. E. Gross: *The Journal of Clinical Investigation*, Volume XIX, 1940, page 774.
- (7) C. Sternberg: *Verhandlungen der deutschen pathologischen Gesellschaft*, 1910, page 357.
- (8) B. M. Patten: "Obstetrics and Gynecology", edited by A. H. Curtis, 1933, Volume I, page 966.
- (9) T. Thompson and W. Evans: "Paradoxical Embolism", *The Quarterly Journal of Medicine*, Volume XXIII, January, 1930, page 135.

## Reports of Cases.

### THE OPERATIVE TREATMENT OF CHRONIC SACRO-ILIAC ARTHRITIS.

By N. D. ROYLE, M.D., Ch.M., F.R.A.C.S.,  
Sydney.

SACRO-ILIAC arthritis is the most frequent cause of low-back pain. It is also the commonest cause of sciatica and of sacro-iliac relaxation. When the disease becomes chronic, surgical treatment by operation is necessary. Many surgical procedures have been proposed for the relief of this disease, but by far the simplest is that introduced by myself in 1935 (*The Australian and New Zealand Journal of Surgery*, October, 1935).

The operation is essentially a fixation of the sacro-iliac joint by means of beef bone screws. Details of the operation are to be found in the above-mentioned journal.

Four patients were subjected to the operation, and the clinical records are as follows.

#### Case I.

The patient, a female, aged thirty-four years, complained of pain in the region of the left sacro-iliac joint, and a pain which radiated down the back of the thigh and the outer side of the leg. Pain was also felt in the mid-sacral region. A few months after the onset the patient became confined to bed, but this did not relieve the pain. Sedatives were of little avail. The sacro-iliac joint was so tender that new-growth was suspected. The patient could not put her heel to the ground, because this act led to severe pain referred to the distribution of the sciatic nerve. The operative treatment was carried out in 1932, with immediate relief of sciatica and of the pain in the left sacro-iliac joint. The patient was able to walk fourteen days later and has had no return of pain in that joint during the past nine years.

The right sacro-iliac joint subsequently became affected, and for this condition she had a tibial graft inserted at Oxford; but this gave no relief and she still has sciatica on the right side, but none on the left.

The contrast in results means nothing to the feminine mind, for she attributes the sciatica on the right side to the fixation of the left side, although the pain was immediately relieved in that joint and in the sciatic nerve on that side. Pain on the right side was felt subsequently to operation, though X-ray examination showed arthritis to be present at the time.

#### Case II.

The patient, a male, aged twenty-eight years, had had pain in the region of both sacro-iliac joints for four or five years, but worse during the three or four weeks prior to his being examined. The pain was worse at night and radiated down the back of the thighs to the knees.

Operation was carried out in March, 1936, and a single screw was inserted into each sacro-iliac joint. Relief of pain followed for six months, when slight pain recurred in the right hip at night. This pain subsequently disappeared and the patient obtained complete relief.

#### Case III.

The patient, a man, aged twenty-seven years, had had pain in the right sacro-iliac region for two and a half years. Pain had been felt in the region of the left joint for one month and in the distribution of the sciatic nerve for two months. He had been treated with diathermy and had had defective teeth removed.

I prescribed a sacro-iliac belt and recommended the use of a spiral spring bed, but the disability remained. He underwent operation on March 4, 1937. During convalescence he had pain in both lower limbs, but was free of pain when he reported to me six weeks later. In January, 1941, he described himself as a "new man" since he had undergone operative treatment.

#### Case IV.

The patient, a female, aged forty-three years, was examined ten years ago, when she complained of pain over the lower part of the spine and in the region of the right sacro-iliac joint. Pain was present on movement of the right lower limb forwards, and pain was felt in the distribution of the right sciatic nerve. There was tenderness on pressure over the right sacro-iliac joint. She was treated with a rubber belt and the use of a spiral spring bed, with relief; but the pain subsequently returned.

She underwent operation on July 19, 1940, and the right sacro-iliac joint was fixed with two screws. She obtained immediate relief. In a report twelve months later she described the operation as a great success.

### Comment.

Fixation of the sacro-iliac joint can be effected by the insertion of one 4.5-millimetre bone screw; but results show that two screws are more certain in securing immediate relief.

It must not be supposed that the bone screws remain intact, for they are gradually absorbed and are replaced by strong bands of fibrous tissue, which act as extra ligaments ensuring stability of the joint. No patient should be subjected to operation before treatment with a rubber belt and a spiral spring bed has been tried and found to be ineffective in giving permanent relief.

## Reviews.

### A TEXT-BOOK OF PHYSIOLOGY.

THE publication of a new edition of any text-book in England at the present time must be attended by such difficulties that any criticism is apt to seem carping. In the ninth edition of "Bainbridge and Menzies' Essentials of Physiology",<sup>1</sup> edited by Professor Hartridge, the alterations are but slight and many errors of the previous edition have escaped attention. The editor has had the rather unsatisfactory task of revising the book without altering the subdivision of the letterpress, the pagination and the indexing.

The need for further revision is especially evident in biochemical sections, which perhaps occupy an undue proportion of an elementary text-book of physiology, although the attempt to compress and simplify this part of the material is only too evident. Among errors which have escaped revision are the classification of carotene, the mother substance of vitamin A, as a member of the group of sterols. In the discussion on the vitamins it is rather unfortunate that in regard to the only example for which a structural formula has been given, the vitamins D, the essential fact should have been missed that in the formation of these vitamins there is an opening of the cholane ring of the sterols from which they are derived. The statements that vitamin B is a mixture of B<sub>1</sub> and B<sub>2</sub>, and that the latter consists of riboflavin and nicotinamide, are misleading over-simplifications of the facts as at present known. Again, the analogy adduced between the heat coagulation of proteins and the clotting of caseinogen by rennin is quite a false one, as the two processes are chemically distinct and have only a superficial similarity. In the discussion on the work of the heart no mention is made of the increasing fraction of the whole work which is used to impart kinetic energy to the blood as output rises.

On the whole it is to be regretted that the publication of a new edition of this text-book, which is so widely used by junior students of physiology, should have been undertaken before an adequate revision of the previous edition could be carried out.

### TRAINING FOR CHILDBIRTH.

IN providing an up-to-date course of physical education for prospective mothers, "Training for Childbirth" is a valuable contribution to obstetric practice.<sup>2</sup> It is written from the mother's point of view and stresses the value of obtaining her fullest confidence and cooperation. The course of instruction trains her to perform all her natural functions during the pre-natal, intra-natal and post-natal stages.

Those who appreciate the menace of mental stress and exhaustion in pregnancy must welcome the results this education will achieve. A calm patient, capable of purposeful muscular action or of relaxation at will, who has been taught her part mentally and physically, is an important efficiency factor in a successful confinement. As Dr. John S. Fairbairn in his foreword writes: "The success of all attendants on child bearing women is determined largely by the confidence aroused and the influence obtained among those they attend. None of these attendants will but acclaim 'Training for Childbirth' as a valuable aid towards his or her purpose as a helper of prospective mothers."

The chapter on elementary anatomy and physiology could not be improved either in text or in illustration.

The pre-natal exercises and postures described in Chapter II are original in design. Briefly their purposes are: (i) to increase the mobility of the joints of the pelvis and thus increase the diameters of the brim, the cavity and the outlet; (ii) to maintain muscle tone; (iii) to educate the patient in a muscle function she will use in expulsion. The exercises are so well planned that their continuous practice ensures an habitual muscle performance which functions appropriately at the actual birth.

To the uninformed some postures in the book may appear extraordinary, but in actual practice they are useful and comfortable—for example, the knee-chest position—because the basis of these exercises is physiological and anatomical.

<sup>1</sup> "Bainbridge and Menzies' Essentials of Physiology", edited and revised by H. Hartridge, M.A., M.D., Sc.D., M.R.C.P. F.R.S.; Ninth Edition; 1940. London: Longmans, Green and Company. Demy 8vo, pp. 696, with illustrations. Price: 16s. net.

<sup>2</sup> "Training for Childbirth, from the Mother's Point of View", by M. Randell, S.R.N., S.C.M., T.M.M.G.; 1939. London: J. and A. Churchill Limited; Sydney: Angus and Robertson Limited. Foolscap 4to, pp. 164, with 118 illustrations. Price: 12s. 6d. net.

The essential fact is that if any exercise in the routine proves difficult or fatiguing, it is being done incorrectly. The aim and object of the exercises is to achieve a slow, effective, efficient and complete movement. The routines may be accepted wholly or in part, at the discretion of the obstetrician and according to the needs of the particular patient.

A feature of the book is the teaching of relaxation, so important as the link between the conscious effort and the unconscious effort of the body during confinement. The mother who has learnt relaxation becomes quiet, cooperative and confident, eliminates fear and tension, and understands what her doctor and her nurse ask her to do.

The post-natal exercises restore the normal tone and function of muscles and joints before the mother has to take her body weight, and thus eliminate the tendency to backache, prolapse, frequency of micturition *et cetera*. However, this post-natal section is disappointing because it does not provide a graduated table of exercises, particularly during the lying-in period, when early movement and general exercises for circulatory purposes are so important. This section does not include the full table of Miss Randell's exercises as given by the late Miss Barbara Mortimer Thomas in her lecture-demonstrations in Australia in 1938.

An advantage of the book is the assurance to mothers that pregnancy is not a deformity and that by simple methods they can retain or resume correct posture and normal figure. Moreover, it enables the mother to conduct herself through all stages of her pregnancy in an intelligent manner and with a feeling of confidence and strength in her own power.

The book embodies the results of long experience and careful selection of movements and postures most fitted for the purpose in view, and represents the standard set by one of Britain's foremost obstetricians, while Miss Randell must be recognized as an authority in her own field. Before this book was written, a film based on Miss Randell's teaching was produced in Sydney, under the auspices of the Department of Public Health, by Miss Mortimer Thomas in 1938. It has been used extensively in the teaching of medical students, midwives and masseuses, and copies have been obtained by other States. Since the establishment of the routines of this work in the metropolitan obstetric teaching hospitals in Sydney it has been possible to assess their great value.

### WEIGHT REDUCTION.

DR. E. E. CLAXTON's book on weight reduction is welcome, though in 201 pages the author tells the physiology student nothing new.<sup>1</sup> He explains "Calories" in an interesting and simple manner and gives all necessary information concerning the rules for reduction of obesity in so far as diet is concerned. He mentions but does not deal with the wide subject of glandular dysfunction. In the preface he writes: "... everyone should remember that fat must come from somewhere. If it does not come from food where does it come from? Nothing can increase unless it is added to, so quite obviously if success is to be assured diet must be the basis of ALL treatment of ALL types of obesity ..."

From a "Mainly Historical" chapter he works through "What is Obesity?", "Disadvantages of Being Fat", "Reasons for Obesity", "Food and its Functions", "Bodily Energy", "How to Work out a Diet", "Method of Diet and Rules for Weight Reduction", "Food Tables" (very practical). Miss Lucy Burdekin contributes 104 pages of useful recipes specially suitable for diabetics. A "War Appendix" gives hints on vitamin intake during war-time food rationing.

This is a sane and valuable book. It is well printed, though one or two typographical errors may be found in the tables.

### THE PRACTICE OF SURGERY.

"The Short Practice of Surgery", by Bailey and Love, has been published in a fifth edition.<sup>2</sup> High praise has been given in previous reviews by this journal to earlier editions, and this praise still stands. The outstanding feature of the book is the excellent way in which the material is set out and the ease with which it lends itself to study and reference. In this respect it may serve as a model to many other authors of text-books.

<sup>1</sup> "Weight Reduction, Diet and Dishes", by E. E. Claxton, M.B., B.S., D.T.M. & H., recipes by L. Burdekin; Second Edition; 1941. London: William Heinemann (Medical Books) Limited. Demy 8vo, pp. 210. Price: 8s. 6d. net.

<sup>2</sup> "A Short Practice of Surgery", by H. Bailey, F.R.C.S., and R. J. M. Love, M.S., F.R.C.S.; Fifth Edition; 1941. London: H. K. Lewis and Company Limited. Demy 8vo, pp. 1,023, with 850 illustrations. Price: 30s. net.

## The Medical Journal of Australia

SATURDAY, OCTOBER 11, 1941.

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### THE CHILD AND THE STATE.

In a recent issue of this journal passing reference was made in these columns to the effect of a falling birth rate on the population of Australia. The occasion was a discussion on post-war immigration, and some figures were given which showed that the number of immigrants would have to run into many thousands if a certain annual increase in population was to be maintained. The figures quoted were subject to the proviso that the present crude death rate remained at the level of approximately 9.5% and the birth rate at approximately 17.5%. The statement that the new-born child is a country's best immigrant has been made so often that it has almost become a cliché, but cliché or not, it must be made again. Since this form of immigration is not flourishing as it used to flourish years ago, and since there is every reason to doubt whether the present low birth rate of 17.5% will be maintained, it is not unnatural to ask the reason why. We do not propose in the present instance to discuss the question of the falling birth rate as a whole, but rather to consider one or two of its aspects as they have a bearing on the relationship between the child and the State.

A woman's natural instinct is to have children, and there is no doubt that a woman with a family of growing children who is in a position to give them proper care and to make adequate provision for them has the opportunity to lead a full, complete and happy life. The psalmist must have had something of this kind in mind when he wrote of children: "Happy is the man that hath his quiver full of them." But those must have been care-free days—the world then knew nothing of economic systems, so-called civilization had not arrived and education was for the few and not for the many. All that has been changed, and we find today that many reasons are advanced to explain the refusal of women to have children. We shall consider some of these, but must first of all make it clear that it is very difficult to generalize about such a subject, and that in regard to many statements room for difference of opinion will surely be found. Many persons hold that there are in the community women who

refuse to have children because of their own inherent selfishness—they are not willing to restrict their social activities, or they resent what they call the disfigurement that comes with the pregnant state, or they are fearful of the act of childbirth. These reasons for refusal to bear children are not germane to our subject, but they must be mentioned because some persons may give them equal weight with economic factors. That moral considerations may have to share the ultimate responsibility for the growth of social evils will be freely admitted; opinions, however, will differ about the extent to which they can be blamed. The chief reasons for the falling birth rate with which the State is concerned are economic. It is a commonplace to hear a married couple say: "We can afford to have one child, but not more than one." Children have been described as poor man's riches. Several meanings can be read into these words, but, however we interpret them, we cannot take them to mean that a "quiver full" of children will endow a poor man with riches in the form of pounds, shillings and pence. The married folk who say that they cannot afford to have more than one child are, we can be quite sure, speaking the plain and honest truth. (Here, of course, we exclude those of the unmoral and selfish type who have just been mentioned.) We cannot perhaps blame the legal luminaries who determine that a man and his wife and two children should be able to live on so much a week; we can blame the tradition of cold theorizing with which their administration of the law has become surrounded; we can also blame those who, whenever they can, take the minimum for the maximum and so perpetuate a false position of which they could not possibly feel proud if they gave it any serious thought. There is another group of people whom we should not perhaps blame too much, but who should be induced to extend their vision—these are they who say that it is no use giving more to "these people", that they will only spend it on "the dogs" or something equally valueless. This is probably true of a small number; it would be true of a certain number, however much they earned or however far they were put in the way of enlightenment; it is true of many who have plenty and to spare. When people have been practically "mothered by the street" and nurtured by its flinty grimness, there seems little else to do in spare time than seek "the pictures" or "the dogs". Were their homes habitable, and were some concerted and real effort made to teach them how to use their leisure, more could be expected of them. As we leave the general statement that the State has in the economic sphere certain responsibilities to the child and pass on to consider what is being and what remains to be done, another pungent reason often put forward for the deliberate restriction of families must be stated. Many a woman today and during the last twenty-five years has declared that she does not want to bring into the world men who will grow up only to be killed in some war that is not of their creation. This is a statement for which it is not easy to find a convincing reply. If we are to believe such writers as Douglas Reed, we are not all to be held blameless of the "Insanity Fair" that grew up before the present war overtook us. This is not the occasion for a discussion on that subject, but we can all determine to do what lies in our power after the present turmoil has passed to make another recurrence impossible. So far by merely touching on the



fringe of the subject we have tried to show that the State has a duty to the children who have been born, who will be born and who ought to be born into the world, by making it possible for young men and young women to marry and have children with a knowledge that their everyday work will allow them to give to their children a decent home, healthy surroundings, sufficient food and a suitable education. What has already been done by the State for the child and what remains still to be done may be discussed under two headings, the purely medical and the sociological or partly medical. There will be little that cannot be included under these headings. On the strictly medical side the care of the child begins or should begin at the moment of its conception. The mother's health must be so safeguarded and her life must be so ordered that her child at birth will be free from inherited disease and fit for its future adventures. This end can be achieved by the ante-natal clinics attached to hospitals in every State. The State also provides maternal and infant welfare services to care for the mother and her child in its early years. Theoretically the entry of every child into the world can be made relatively safe and can take place under medical supervision. In practice there are many gaps and the medical profession looks forward to the establishment of an adequate maternity service so that every young Australian may have as good a start in life as medicine can give him. For the infant, the pre-school child and the child-at-school State services exist and useful work is done, though, as recently shown in these pages, the activities of the last-mentioned service is in some States hampered by inadequate staffing. The view that the State should insist on the supervision of the health of children before and after birth does not imply supersession of the general practitioner. Those members of the community who can pay for and who desire the services of a private practitioner should have the right to their preference, and it should not be beyond the wit of a wide-awake State to fashion a scheme by which all persons in the community would be called upon to produce evidence that they had secured for their children certain specified benefits. Particularly should this be emphasized in regard to supervision of the health of school children. The medical inspection of school children, though it may still be imperfect in State schools, should be extended to schools controlled by private persons and private organizations. The State should insist on the appointment by school authorities of medical inspectors who would at stated intervals forward a report on their work to the health authority. The medical inspection of non-government schools should not be left to the whim of the school proprietor.

On the sociological or partly medical side there is much to be said. Mention has already been made of the earnings of the poorer members of the community in relation to their willingness to have children. Their ability to make proper provision for their children is a question of money. At long last family endowment has been introduced into Australia and the burden of the wage earner with children will be lightened. Whether the provision that has been made is sufficient or whether the administration of the benefit is wisely planned is open to argument. The benefits can if necessary be increased and the method of administration can be bettered; the important fact is that the policy of family endowment has been admitted

to be necessary. This brings us to the subject of nutrition, for we can expect that family endowment will mean better food for the children. The responsibility of the State in regard to food will not be met by the introduction of family endowment. Australia is blessed with an abundance of good food, but its distribution is as imperfect as the food is abundant. The wicked policy of allowing surplus food to be thrown away or of forbidding its use for the purpose of keeping the price up when it could be used and should be used to give essential nourishment to masses of the people would not be tolerated in a community that was really democratic. People have, for example, grown tired of protesting about the iniquity of the regulations under which the Apple and Pear Board is run, when tons of good fruit suitable for children and necessary to their health, are buried or fed to pigs. Reasonable protest based on sound argument is never effective in a matter of this kind. Ridicule may be suggested as an alternative. If the nation could find a suitable person for appointment as Public Satirist and set him to tackle some of our national stupidities at the behest of a really sensible director, again if such a person could be found, we might make some headway. In some ways it is a pity that W. S. Gilbert lived and died when he did.

One responsibility of the State to its children has yet to be mentioned; it has to do with what for lack of a better term we may call living space. It includes housing—the homes in which children live and the schools where they are taught; it also includes the provision of playgrounds, both in municipal centres and at schools. Housing or the provision of homes has recently been discussed in this journal and need not delay us further. The provision of suitable school accommodation is an urgent matter in some places. It has recently been brought to the notice of the New South Wales public in the Sydney Press by school teachers who in discussion on the proposed abolition of the use of the cane have rightly pointed out that the primary consideration should be the prevention of overcrowding in class rooms. In some New South Wales government schools many pupils are sometimes crowded into rooms intended for half the number, class rooms have been fashioned from cloak rooms and newspaper pictures have shown pupils being taught in passage ways. Neither teachers nor pupils can be expected to do good work under such conditions, and we think that the views of the teachers on overcrowding should be heeded by the public who alone can compel action to be taken. The overcrowding of schools, like that of mental hospitals, is an insidious business and it is made worse by a process which begins with failure to make good a small deficiency—"It is only small, there is not much money, it can wait till next year." Next year the need is a little greater and so on year after year until the deficiency is so great that much, far too much, money is needed to effect a remedy. Medicine comes into the picture from the fact that overcrowding in the school is almost as bad for children as overcrowding in the home, but further consideration of this and of playgrounds must be left for another occasion.

In a discussion such as this it is simple to state requirements, but not so simple to have them met. The State responsibilities for children are the concern of different government departments controlled by different ministers. We have considered matters of health, of education and

of social services, and have also referred to general economic standards. It would clearly be impossible to bring under one administration all the State activities that have to do with children's health and well-being: overlapping could not be avoided. The key to the problem is education of those who lead the public. This is in itself a big subject and really merits a separate discussion, but for present purposes it is sufficient to state that if the people are properly led, especially by those closely associated with them in everyday life, they will probably follow. This is the only way in which all sections of the community can be made to take the long view. The future of Australia as a nation able to make a contribution to the peace of the world and the welfare of humanity will depend chiefly on the health of body, the freedom of thought and the vigour of mind with which it endows its children.

## Current Comment.

### THE ARREST OF BLEEDING.

THE mechanism of the coagulation of the blood has been well understood in outline for a good many years. In 1882 G. Hayem made a small incision in a vein, and when the bleeding had ceased spontaneously he observed that the opening was plugged by a mass composed of a mixture of fibrin and blood platelets. It has since been generally believed that the spontaneous arrest of any bleeding is brought about by the formation of a clot of blood or a mass of agglutinated platelets or both, aided perhaps by constriction of damaged vessels and lowering of blood pressure. It has been observed that when the coagulability of the blood is defective or the platelets are reduced in numbers there is often a tendency to persistent bleeding. The physiologist has done much since the days of Hayem, especially in the first two decades of this century, to elucidate the mechanism of coagulation in detail; the discovery of heparin in 1928 and of vitamin K in 1938 illuminated but complicated the problem. That our understanding of the mechanism of hæmostasis involves an understanding of more than the mechanism of coagulation is frequently felt by physicians faced with the treatment of serious hæmorrhagic disease, and this has been emphasized in a recent critical review of hæmostasis by R. G. Macfarlane,<sup>1</sup> who puts the following six questions:

1. If the platelets can stop bleeding by agglutination into masses, why does hæmorrhage occur in hæmophilia, in which they are present in normal numbers?
2. If the coagulation of the blood can stop bleeding, why does bleeding persist in *purpura hæmorrhagica*, in which the blood outside the body clots firmly in the normal time?
3. If it is argued that both normal platelet numbers and normal blood-clotting are needed to produce hæmostasis, why does severe or even fatal bleeding occur in telangiectasis, in athrombocytopenic purpura, and in some forms of hæmorrhagic jaundice, when in such cases the platelets are normal in number and there is no delay in the clotting time of the blood?
4. What are the factors involved in the investigation known as bleeding-time? Why is the bleeding-time normal in hæmophilia and prolonged in the purpuras, whether the platelets are reduced or present in normal numbers?
5. Why does splenectomy often result in a remission of the hæmorrhagic symptoms in cases of thrombocytopenic purpura, though the platelet count may remain at, or return to, its original low level?
6. If both *purpura hæmorrhagica* and hæmophilia are due to a generalized failure of the hæmostatic system, why are the hæmorrhages in the two conditions so different in their character and distribution?

Macfarlane has concluded from his review that the blood platelets play no important part in the hæmostatic

mechanism apart from accelerating coagulation and clot retraction. He has collected ample evidence that the platelets may be reduced to very small numbers without any impairment of hæmostasis and that the bleeding time may be greatly prolonged even though the platelets are present in normal numbers. He has also concluded that the clotting of the blood is incapable by itself of arresting bleeding even from a needle puncture, though the formation of a firm clot is necessary for the maintenance of hæmostasis produced by some other factor. He has observed also that when the blood is rendered incoagulable, bleeding from small punctures ceases as quickly as in the normal animal, while in some diseases a patient may bleed for hours from a small puncture though no coagulation defect can be demonstrated. If the clotting of the blood does not control the bleeding from small wounds and if the platelets also are excluded, what factor remains capable of producing hæmostasis? Only the action of the vessels themselves. He has produced photomicrographs showing that the capillary blood vessels at the base of the finger-nails contract after injury, but dilate again subsequently, and also that this contraction is absent in hæmorrhagic states associated with prolonged bleeding time.

From his experiments and review Macfarlane has put forward what he modestly calls a tentative hypothesis of hæmostasis. He suggests that the sequence of events is as follows. When a wound is first inflicted, bleeding occurs from the injured capillaries dilated by the influence of "H" substance set free from the damaged tissues. When the "H" substance has been removed by the flow of blood or by diffusion, the capillaries are able to contract and bleeding ceases, the action of the vessel being probably assisted by the agglutination of platelets. During the period of capillary contraction the blood which has escaped has time to coagulate firmly in the wound and the clot to retract and become firmly attached. After the period of capillary contraction the injured vessels dilate again, and this is possibly the first stage of organization; the preformed blood clot is now essential for the maintenance of hæmostasis. In the case of small punctured wounds the approximation of the edges and drying of the exudate are enough to prevent the onset of bleeding and clotting is not necessary for hæmostasis.

If Macfarlane's hypothesis is correct, it becomes possible to answer his six questions. In hæmophilia the platelets are present in normal numbers, but hæmorrhage occurs. Macfarlane has observed that after punctured wounds of the nail bases in hæmophilia the capillaries contract in the normal way, hence there is no tendency to bleed from small punctured wounds; after severer injuries a short period of hæmostasis may occur because of this capillary contraction, but owing to a firm clot not having formed, bleeding is resumed and is then persistent. Defective coagulation is also responsible for the hæmorrhagic tendency in fibrinopenia, some cases of hæmorrhagic jaundice and hæmorrhagic disease of the new-born. In the hæmorrhagic purpuras the blood outside the body clots firmly in the normal time, but there is defective capillary contractility so that after injury the initial flow of blood remains unchecked and a clot consequently cannot be formed in contact with the bleeding point; this contact with the bleeding point is essential, because hæmostasis cannot be maintained if the clot is not formed at the right spot. Coagulants are not effective, because even rapid clotting of the issuing blood may be unable to arrest the bleeding if the flow is continuous; but pressure is effective because this arrests the flow and gives time for the formation of a firm clot that can maintain hæmostasis when the pressure is relaxed. Splenectomy may restore the capillary function without producing a rise in the number of blood platelets or may fail despite such a rise. Similarly, defective capillary contractility is present in hæmorrhagic telangiectasis. In some diseases, notably in jaundice and hæmorrhagic disease of the new-born, there may be capillary and coagulation defects combined.

It is clear that Macfarlane's contribution to the vexed literature of the arrest of hæmorrhage enables us to survey the confused scene with a new and clearer perspective.

<sup>1</sup> *The Quarterly Journal of Medicine*, January, 1941.

## Abstracts from Medical Literature.

### RADIOLOGY.

#### The Principles of Radiographic Diagnosis in Acute Abdominal Conditions.

EUGENIO PUTÓ VILLAFANE (*Revista Médica Latino-Americana*, January, 1941) indicates the importance of radiography in the diagnosis and prognosis of acute abdominal conditions. The appearance of spontaneous pneumoperitoneum, found in perforation of the bowel, and the alteration of fluid levels, seen in obstructive states of the bowel, have a typical radiographic appearance. The plain skiagram of the normal abdomen reveals the outline of the lower edge of the liver, the spleen, both kidneys and the psoas muscles; the stomach and colon are also visible if they are sufficiently distended with gas. In peritonitis the outline of the compact viscera is blurred and the clear space between the hilum and the lower pole of the kidney and the edge of the psoas muscle may be obliterated by the shadows of exudate. Normally the intestinal loops have a clear-cut, straight and narrow appearance; in peritonitis they have a thickened, ragged outline and the usual regular contour is lost, being replaced by irregular loops. In the normal pelvis the full bladder gives a clear space; this, in peritonitis, may be replaced either by a uniform shadow of varying density or by bands of localized exudate. These shadows, caused by exudate, contrast with the clear gas spaces of the rectum. A series of pictures, taken at regular intervals, may have a definite prognostic value, as they may show an increase or diminution of the collections of exudate. The author describes the "ileus segmentario", the first sign of a localized infection of the peritoneal cavity. This consists of a gaseous dilatation of the intestine in the immediate neighbourhood of the infective process; it is to be distinguished from non-pathological gaseous distension and from advanced paralytic ileus.

#### The Diagnosis of Acute Portal Thrombosis Pylephlebitis.

ANTHONY BASSLER (*American Journal of Roentgenology*, May, 1941) states that in a condition as difficult as portal thrombosis to diagnose, and often even to suspect, any aid to diagnosis is worth while. There is reason to believe that in the acute cases at least valuable information toward the diagnosis of portal thrombosis may be gained by X-ray examination. In the skiagrams it has been noted that the stomach and duodenum emptied normally and the colon showed no delay beyond the first third of the transverse colon. The entire small intestine from the jejunum down was considerably slowed in its transit function. With barium given by mouth, the small intestine is usually empty in from five to seven hours, and in small intestine obstruction proximate accumulations are suggestive of point blocking. Occasionally hypomotility is noted in the small intestine, as in some cases of late pulmonary tuberculosis, avitaminosis and ulcerative colitis; but in these the slowing is not so marked, the descending limb of the jejunum is

never involved, and emptying of the stomach and duodenum and left half of the colon are also slowed and not normal, as in the cases of portal thrombosis. However, it is as if the blocking of the circulation slows down the transit of the barium generally along many feet of the bowel, and this as late as twenty-four or more hours; instead of the intervening barium between the head and tail being contiguous or showing in a feathery order after six hours, the barium occurs in mass collections with intervening empty areas (segmented) and, where the barium collects, it is seen as dense patches with no suggestion of *valvula conniventes* or lumen formation.

#### Bone and Joint Tuberculosis.

LOUIS NATHANSON AND WILLIAM COHEN (*Radiology*, May, 1941) review a large series of cases of proved bone and joint tuberculosis. In this series 42% of the paediatric patients and 55% of the adult patients manifested some form of pulmonary tuberculous infiltration. This high incidence is contrary to the view commonly held. Other important and frequently occurring complications were pleural effusions, genito-urinary tuberculosis, tuberculous peritonitis, tuberculous meningitis and amyloidosis. The vertebral body may be primarily involved in its anterior, central or posterior portions, in addition to its margins. The small parts of the vertebrae are infrequently involved, and such involvement is usually secondary to disease in one of the abovenamed areas. Marginal involvement occurs most frequently in adults and is usually associated with narrowing of the intervertebral disk. Pain is common, but collapse of the body is a late manifestation of the disease process. The central type of lesion is found chiefly in young children. Collapse of the body occurs early in the disease, but pain and narrowing of the intervertebral space are later manifestations. Posterior involvement is more frequently associated with clinical evidence of cord involvement than lesions producing marked collapse of vertebral bodies with kyphosis and gibbus formation. In this type of involvement, as well as in the central and anterior form, the intervertebral space is not necessarily narrowed. Primary shaft tuberculosis is relatively uncommon in children, but involvement of the short tubular bones is frequent. Both are rare in adults.

#### Sarcoid Disease as Revealed in the Chest Skiagram.

DONALD S. KING (*American Journal of Roentgenology*, April, 1941) states that sarcoidosis is a disseminated disease which involves particularly the skin, lymph nodes, lungs, eyes, bones and spleen, though it may affect almost any organ in the body. It is the *lupus pernio* of the dermatologist, the *uveo-parotitis* of the ophthalmologist, the cold or torpid form of disseminated tuberculosis of the tuberculosis specialist, the *osteitis tuberculosa multiplex cystoides* of the orthopaedist, and a few other syndromes rolled into a single disease which looks like tuberculosis but does not act like it, since sarcoid runs a comparatively benign course. In approximately 50% of the author's series of cases characteristic changes were present in skiagrams of the chest. The process may be confined entirely or mainly to the hilar nodes. It may involve the hilar nodes and apparently radiate from them into the lung fields. It may involve only the

lung fields, giving an appearance indistinguishable from miliary tuberculosis. The chest skiagram is not a measure of the gravity of the disease. Extensive pulmonary changes may clear without ever giving rise to respiratory symptoms and be accompanied by only slight evidence of a disseminated process. On the other hand, there may be little chest involvement, as shown in the skiagram, but lesions in other organs which cause prolonged and serious disability. In about 50% of the cases in the author's series complete clearing occurred after a period of from seven weeks to three years, the average time being twenty-two months. Bone lesions were present in a little over 10% of the series. *Erythema nodosum* gives a chest skiagram indistinguishable from that of sarcoid disease.

#### Radiological Manifestations of Pulmonary Oedema.

CURTIS B. NESSA AND LEO G. RIGLER (*Radiology*, July, 1941) state that pulmonary oedema cannot always be diagnosed when its manifestations are atypical, but should be considered especially in cases of cardiac failure, renal disease, liver disease, after operations and following transfusion reactions. Excessive intravenous and subcutaneous fluid is an important factor in the development of pulmonary oedema after surgical operation. The alveolar fluid tends to collect in the centre of the lungs, leaving the periphery clear. As a result, a butterfly-shaped density is the classical finding. The condition may be localized to one lobe or one lung and thus simulate pneumonia or pulmonary infarct. The authors report several cases in detail.

#### Regional Ileitis.

GEORGE FRIEDLANDER (*British Journal of Radiology*, May, 1941) states that patients with acute regional ileitis are very seldom subjected to X-ray examination, as they are almost invariably regarded as suffering from acute appendicitis and operated on at once. In cases in which an X-ray examination has been made at a relatively early stage of the disease, nothing abnormal has been found in spite of typical findings on operation. It might very well be that if the radiologist had thought of the possibility of a regional ileitis, and the investigations of the lower part of the ileum had been made at a proper time, at least some rigidity, changes in the mucosa pattern, or some slight irregularities might have been visible, in accordance with the pathological picture. Nearly all the patients who have been examined by X rays belong to later stages in which there is absence of the normal mucosa pattern due to swelling and ulceration of the mucosa, marked irregularity of the outline, and narrowing and rigidity of the affected portion. A constant filling defect is visible and the affected part presents itself as a narrow, distorted, linear shadow without peristaltic movements. The extent of the defect is dependent upon the extent of the lesion, and these may, of course, be multiple. The "string sign" or "twisted cord appearance" is very suggestive, but these signs are not always present, nor is their presence pathognomonic of regional ileitis. The twisted cord appearance may be seen at some time in the course of the examination, but disappears later on, to show the whole extent of the filling defect very clearly, when the affected bowel is better filled. The loops of the ileum proximal to the



filling defect may be of normal appearance, but more often there will be continuous absence of changes in their shape and position in spite of normal mucosa pattern, showing that they are fixed by dense adhesions. If actual partial obstruction occurs, dilatation of the loops proximal to the filling defect is present, and stasis may be considerable. The meal may take nine hours or even more to pass through the narrowed part of the bowel. Caecum and ascending colon are those parts of the large intestine in which fairly often additional radiological changes are to be seen. Transverse and descending colon and sigmoid are rarely involved, apart from fistula formation. The visible changes may be due to mere spasm secondary to the iliac disease, in which case they are intermittent. But they may be caused by extensive adhesions or an extension of the ulcerative process from the ileum, in which case they are permanent.

#### Radiological Manifestations of Arteriosclerosis of the Branches of the Abdominal Aorta.

WALTER W. FRAY (*Radiology*, April, 1941) states that calcification of the arterial walls of the celiac axis is frequently observed in elderly subjects. The location of the shadows is typically over the left upper quadrant, the proximal branches lying at the level of the dorso-lumbar junction, while the more distal branches vary widely, shifting in position with the organ supplied. The calcification produces shadows of diverse shapes, varying from short crescents to complete rings. Straight plaques alone are rarely observed. While the branches of the celiac artery serve the organs of both upper quadrants, calcification over the right upper quadrant (hepatic branch) is rarely identified. Over the left upper quadrant the calcification is commonly multiple.

#### PHYSICAL THERAPY.

##### Treatment of Laryngeal Cancer by Irradiation.

D. QUICK (*American Journal of Roentgenology*, July, 1941) previously, in 1937, before the International Congress of Radiology, reviewed the treatment of laryngeal cancer. He now proves the experience of the three intervening years in dealing with new material and observing patients previously treated, and endorses the conclusions drawn in his previous review. He states that when external irradiation only is being used, the usual safe minimum dose is the maximum that the normal surrounding structures will tolerate. It is his impression that factors other than histopathology have much more influence over the response of a given laryngeal tumour process to irradiation. Apart from technical errors, infection plays the most unfavourable role. Carefully administered X-ray therapy offers an excellent chance for cure in laryngeal cancer uncomplicated by previous treatment. This method is applicable to a larger group than is radical surgery; it is free from interim risk and results in complete restoration of function. There is a limit beyond which it is unsafe to increase the X-ray dosage. In the treatment of tumours resistant to

Röntgen irradiation, of recurrences, and of patients whose tumours have been incompletely treated, laryngofissure plus radon implantation or the cautery offers a chance for future cure, but without restoration of function in all except an occasional case. Metastases in cervical nodes are treated by surgical exposure and radon implantation; their occurrence is infrequent.

##### Trans thoracic X-Ray Treatment of Cancer of the Oesophagus.

M. STRANDQVIST (*Acta Radiologica*, March, 1941) gives a detailed account of 36 cases of cancer of the oesophagus in which treatment with large doses of X rays was carried out during the years 1936 to 1939 at the Radiumhemmet, Stockholm. All the tumours were situated in the thoracic part of the oesophagus. It was considered essential for this form of treatment that the patient was in good general condition, the age should preferably not exceed seventy years, the temperature and sedimentation rate should be normal or only slightly elevated, the patient was able to swallow at least liquids, and the length of the lesion should not exceed 10 centimetres. Every patient who was accepted for treatment was admitted to the clinic and kept there during the entire treatment. To obtain a suitable cross-firing of the chest, it was found necessary to use three anterior and three posterior fields of entry. The skin portals were outlined on the front and back, a start being made with the portals in the mid-line, which were centred exactly over the tumour. It was of the greatest importance to reduce as much as possible the volume of body tissue to be irradiated in order to conserve the local and general tolerance. The aim was to attain a suitable tumour dose, for example 5,000 r, within a certain time period, for example forty days, by means of rather uniform fractionation. The total tumour doses varied in the 36 cases between 3,300 and 5,500 r over eighteen to fifty-three days, and the total skin doses between 2,000 and 3,500 r on each of the six portals. All patients were sent for oesophagoscopy and biopsy as a rule ten days after the beginning of the treatment, when the tumour dose had reached 1,000 to 1,500 r. Details of the reactions during treatment are described, and also the accidents and complications. There were four two-year cures and good palliative results were obtained. The author concludes by insisting that every clinic should report its cases with detailed information as to the daily and total tumour dose expressed in r and the number of treatment days in order that further experience in regard to the ideal tumour dosage may be obtained.

##### The Radiosensitivity of Tumours.

S. WARREN (*American Journal of Roentgenology*, May, 1941) points out that radiosensitivity is a relative term. He classifies neoplasms into three groups, according to their reactions to radiation: radiosensitive tumours which disappear clinically with a total dose of 2,500 r or less of protracted radiation; radioresponsive tumours which require from 2,500 to 5,000 r for similar regression; and radioresistant tumours which require over 5,000 r before a response occurs. In the first group are the lymphomata, chronic leukaemia, and Ewing's tumour of bone. In the second are basal-cell carcinoma of the skin, carcinoma of the cervix uteri and

adenocarcinoma of the thyroid. In the third fall carcinoma of the stomach, malignant melanoma and osteogenic sarcoma. The regression of an irradiated tumour depends on changes in the supporting stroma, both the blood vessels and connective tissue, as well as on the destruction of tumour cells. While histological grading of malignancy is of some assistance in the estimation of radiosensitivity, many tumours of the higher grades are radioresistant and some of the lower grades radiosensitive. The radiosensitive group too are but rarely curable by irradiation. The author stresses the importance of a biopsy before any radiation therapy is undertaken. In carcinoma of the skin most of the failures of radiation therapy have been caused by one of two factors: inadequate dosage or inadequate size of the field. Carcinomata of the larynx are in part radioresponsive and in part radioresistant. The great advantage that radiation therapy offers as contrasted with surgery is that successful irradiation may restore the larynx completely from the functional standpoint. Carcinoma of the stomach appears to be a completely radioresistant tumour. This is particularly disappointing, because surgery still leaves much to be desired. The carcinomata of the rectum and sigmoid are resistant, although at times response may be obtained. In malignant melanoma a few cases of satisfactory response to radiation therapy have been reported.

##### Benign Giant-Cell Tumour of Bone: Late Results Obtained by Radiation Therapy.

T. LEUCUTIA, E. R. WITWER AND G. BELANGER (*Radiology*, July, 1941) present a study of 33 cases of giant-cell tumour of bone in which treatment was carried out between the years 1923 and 1935 inclusive. In a first series curettage and post-operative irradiation were used; in three cases amputation was eventually performed, and in one sarcomatous degeneration and death occurred. In a second series irradiation alone was employed. Among eighteen patients so treated, a good local result was obtained in every instance. Two patients died later from incidental causes. In general, the trend of therapy has been towards conservatism. Modern technique is to use mild doses at intervals of two months or more between the series of treatments. Primary radiation therapy is more advantageous than surgery, for the following reasons: (a) because reossification of the tumour area occurs more rapidly, (b) because it does not lead to infection, (c) because with the proper technique malignant degeneration is obviated. When irradiation is carried out, 200 kilovolts are usually used. A full series of treatments were given in one day in the later cases here discussed, several fields being used for the purpose of cross-firing. The treatment was repeated in two months and at gradually spaced intervals thereafter. The duration of irradiation may extend over a period of two years until complete reossification of the destroyed area is obtained. Some remarkable results have been observed in the treatment of children by very small doses. The authors state that the satisfactory final results obtained justify the recommendation of radiation therapy as the method of choice in the treatment of all giant-cell tumours and related cystic conditions of bone.

## British Medical Association News.

### ANNUAL MEETING.

THE annual meeting of the South Australian Branch of the British Medical Association was held at the lecture theatre of the Institute of Medical and Veterinary Science, Adelaide, on June 26, 1941, Dr. R. J. Verco, the President, in the chair.

#### Annual Report and Balance Sheet.

The annual report of the council for the year ended June 30, 1941, and the balance sheet were adopted on the motion of Dr. F. St. J. Poole, seconded by Dr. A. R. Burnell. The balance sheet is published herewith; the report is as follows.

At the annual meeting held last June, officers and members of the council were elected as follows:

*President:* R. John Verco.

*Vice-President:* Brian H. Swift.

*Honorary Medical Secretary:* John L. Hayward.

*Honorary Treasurer:* P. T. S. Cherry.

*Ordinary Members of Council:* L. R. Mallen, J. A. Rolland, E. A. H. Russell, C. B. Sangster, J. S. Verco.

At the council meeting held on August 1, 1940, the following subcommittees were appointed:

*Scientific:* P. T. S. Cherry, C. F. Drew, M. Erichsen, J. L. Hayward, C. B. Sangster, B. H. Swift, R. John Verco, J. S. Verco, L. A. Wilson.

*Contract Practice:* P. T. S. Cherry, C. F. Drew, M. Erichsen, L. R. Mallen, J. A. Rolland, E. A. H. Russell, A. F. Stokes.

*Library:* J. L. Hayward, Sir Henry Newland, C. B. Sangster, R. John Verco, J. S. Verco.

*Parliamentary Bills:* P. T. S. Cherry, A. F. Stokes, B. H. Swift, R. John Verco.

*Ethical:* P. T. S. Cherry, C. F. Drew, J. L. Hayward, J. Riddell, J. A. Rolland, A. F. Stokes, B. H. Swift, L. A. Wilson, R. John Verco.

#### Meetings.

*The Council.*—The council has met on 13 occasions, the attendance being:

P. T. S. Cherry .....	10	E. A. H. Russell .....	10
C. F. Drew .....	10	C. B. Sangster .....	11
M. Erichsen .....	11	A. F. Stokes .....	11
J. L. Hayward .....	12	B. H. Swift .....	7
L. R. Mallen .....	11	L. A. Wilson .....	11
Sir Henry Newland .....	8	R. John Verco .....	11
J. Riddell .....	10	J. S. Verco .....	12
J. A. Rolland .....	5		

*Scientific Subcommittee.*—The Scientific Subcommittee met once, the attendance being:

P. T. S. Cherry	B. H. Swift
C. F. Drew	R. John Verco
M. Erichsen	J. S. Verco
J. L. Hayward	L. A. Wilson
C. B. Sangster	

*Contract Practice Subcommittee.*—The Contract Practice Subcommittee met on eight occasions, the attendance being:

P. T. S. Cherry .....	5	J. A. Rolland .....	4
C. F. Drew .....	6	E. A. H. Russell .....	4
M. Erichsen .....	7	A. F. Stokes .....	5
L. R. Mallen .....	3	R. John Verco .....	8

*Library Subcommittee.*—The Library Subcommittee met once, the attendance being:

J. L. Hayward	R. John Verco
Sir Henry Newland	J. S. Verco
C. B. Sangster	

*Parliamentary Bills Subcommittee.*—The Parliamentary Bills Subcommittee met once, the attendance being:

P. T. S. Cherry	B. H. Swift
A. F. Stokes	R. John Verco

*Ethical Subcommittee.*—The Ethical Subcommittee met on two occasions, the attendance being:

P. T. S. Cherry .....	1	B. H. Swift .....	1
C. F. Drew .....	2	L. A. Wilson .....	2
J. L. Hayward .....	2	R. John Verco .....	2
J. A. Rolland .....	1		

#### Monthly General Meetings.

Eight scientific meetings were held during the year. Although the attendance at these meetings has been affected by the absence of many members on naval, military and air force service, the council feels that the varied programme arranged for the benefit of members could have met with more support, and desires to draw attention to the value of these monthly scientific meetings. The preparation of papers entails a considerable amount of work, and it is not encouraging to those who are willing to help in this direction when the attendance is not representative of the Branch. It is hoped, therefore, that in spite of the numerous activities in which members are involved in the present national crisis, that the attendances during the coming year will show the appreciation of members of the programme arranged for their benefit. In view of the restrictions placed on transport, the council considered it advisable to cancel the country meeting arranged for Jamestown this year. Through the courtesy of Dr. W. Sangster, two coloured films kindly lent by Dr. R. S. Godsall, of Sydney, were shown to members on October 2, as follows: (1) "The Making of a Surgical Movie", (2) "Cataract Operation". The films proved of considerable interest, and the council tenders its thanks to Dr. Sangster and Dr. Godsall for providing the opportunity for members to see them. Through the courtesy of Professor Sir Stanton Hicks, two cinema films were shown to members at the Institute of Medical and Veterinary Science on May 14, the films being: (1) "Regional Anaesthesia", (2) "Cardiac and Renal Oedema". The council desires to tender its thanks to Sir Stanton Hicks. The following programme was carried out during the year:

#### 1940.

July 25.—Clinical meeting held at Royal Adelaide Hospital.

August 29.—Paper by Dr. R. F. Matters on "Metrorrhagia and Menorrhagia".

September 26.—Paper by Dr. D. R. W. Cowan on "The Control of Tuberculosis".

October 31.—Clinical meeting at the Adelaide Children's Hospital.

November 28.—Short talk by Professor E. Weston Hurst on "The Woodside Throat", and paper by Sir Henry Newland on "Some Advances in Military Surgical Practice".

#### 1941.

February 27.—Paper by Mr. A. F. Hobbs on "The Treatment of Varicose Veins and their Complications". (Owing to the absence of Mr. Hobbs on active service, the paper was read by Mr. Alan Britten Jones.)

March 17.—Clinical meeting at the Institute of Medical and Veterinary Science.

April 24.—Papers by Dr. Guy Lendon and Professor F. Goldby on "New Aspects of Coronary Thrombosis".

May 29.—Listerian Oration by Dr. J. G. Edwards, of Sydney, on "The Lung Fields in Industrial Disease".

#### Listerian Oration.

The council invited Dr. J. G. Edwards, of Sydney, to deliver the Listerian Oration this year. The invitation was accepted and Dr. Edwards delivered the oration on May 29, his subject being "The Lung Fields in Industrial Disease". There was a satisfactory attendance and the council desires to record its sincere thanks to Dr. Edwards. At the close of the oration those present were entertained at supper in the refectory, University of Adelaide, by the President.

#### Membership.

The membership of the Branch is now 410, an increase of one on the previous year. The number of new members elected was 10, the balance representing transfers "in and out". It is with deep regret that we record the deaths of E. J. Holder, J. S. Proctor and Professor A. Watson.

#### Resignations as Representatives on Boards et cetera.

Owing to his absence from the State on active service, Mr. Alan Lendon resigned as representative on the Dental Board, and Mr. Alan Britten Jones was appointed in July last.

#### Representation on Boards et cetera.

*Medical Board of South Australia:* H. H. E. Russell.

*Dental Board of South Australia:* Alan Britten Jones.

*Nurses' Board of South Australia:* L. A. Wilson.

*Metropolitan Infectious Diseases Hospital Board:* H. H. E. Russell, G. R. West.

*Australian Aerial Medical Services Council:* A. F. Stokes.

*Executive Council Mothers' and Babies' Health Association:* D. G. McKay.  
*Executive Committee for Protection of Civil Population against Gas Attack:* F. H. Beare.  
*State Committee for Coordination of Medical Arrangements for Civilians and the Services:* M. Erichsen.  
*Central Council of the Association:* Isaac Jones.  
*Federal Council of the British Medical Association in Australia:* Sir Henry Newland, A. F. Stokes.  
*Federal Council Contract Practice Committee:* R. John Verco.

#### Sections.

Owing to the absence of members on active service *et cetera*, the work of the sections has been carried on under great difficulty, and fewer meetings than usual have been held.

*Eye, Ear, Nose and Throat Section.*—This section held seven meetings during the year, the average attendance being nine. There are 16 members in the section.

*Surgery.*—This section consists of 35 members. Four meetings were held during the year, the average attendance being 16.

*Clinical Medicine.*—There are 11 members of this section. No meetings were held during the year.

*Anaesthetic.*—Ten members comprise this section, and one meeting has been held during the year.

*History.*—There are five members in this section. No meetings have been held during the year.

#### Lodge Practice.

There has been no change in the rates and conditions of lodge practice during the year. The Federal Council, however, has under consideration a Federal Common Form of Agreement with a view to making conditions of lodge practice uniform in all the States. Much requires to be done, however, before finality is reached in the discussions with the friendly societies. Meanwhile, any developments will be closely watched by the council and its representative on the Federal Contract Practice Subcommittee (Dr. R. John Verco), and the interests of lodge practitioners protected.

#### Lodge Members on Active Service Overseas.

On October 3 last a request was received from the South Australian Friendly Societies' Association asking the permission of the council to allow the charge for medical fees, that is, one unit, to be charged to lodge members' dependants whilst the member was away on active service, thus relieving the lodge of this responsibility. Lodge surgeons will recollect that when it was agreed to make a concession to the lodge members on active service, and treat the wives and children of such members by payment of the single unit, that is, 3s. 6d., it was on the distinct understanding that the lodges would pay the fee and thus relieve the member from this payment whilst on active service. This was the proposal of the South Australian Friendly Societies' Association, and the council was informed that the fee would be paid out of the funds of the lodge. The council, however, could not consent to the request made by the South Australian friendly societies in their letter of October 3, which was a distinct breaking away from the arrangement made, and the South Australian Friendly Societies' Association was advised that the original arrangement should be adhered to and, in the opinion of the council, neither the soldier nor his dependants should be asked to pay contributions for any medical benefit.

#### Adelaide Permanent Post-Graduate Committee.

Owing to the war, the committee decided not to hold the usual post-graduate course this year.

#### Pensions for Early Sufferers from Tuberculosis.

As a result of the council's approach, by correspondence and deputation, advice was received in June last that arrangements had been made by the Government whereby a special type of certificate could be issued by the tuberculosis clinic in cases where a pensioner was living at home, when the department, if the circumstances require, could grant either special foods or increase the cash grant given to the mother of the children, or grant other relief. Cases of hardship caused by patients going into a hospital could be similarly referred to the department for appropriate relief, when the cash grant to the wife of the pensioner could be reviewed. Although this is not all that could be desired, it is a step forward and some recognition by the Government of the urgency for relief in this direction.

#### Registration of Foreign Medical Practitioners.

It was the intention of the council to approach the Government again during the year and ask for the protection provided in the Amending Bill placed before Parliament

last year. It was felt, however, that difficulties would present themselves if the council took further action in the matter, and, acting on advice received, it was decided not to proceed with the Amending Bill. Whilst such a position is disappointing, it was felt that no other course was open in view of the advice received. However, the Medical Board of South Australia has received advice from the General Medical Council, London, that the arrangement for medical reciprocity between the United Kingdom and Italy has been revoked, which means that no further Italian graduates will be registered in South Australia for the present.

#### National Health Insurance.

Members were advised by circular, dated April 9 last, that the Federal Council, believing that the Federal Government would reintroduce national health insurance in the near future, had prepared a scheme for "A General Medical Service for Australia". The suggested scheme was forwarded to the Branch councils for criticism and suggestions, and your council has forwarded a very full criticism of the scheme to the Federal Council. Before any scheme representing the considered views of the profession can be finalized it will be submitted to the members of the various Branches throughout the States.

#### War Emergency Organization. Protection of Incomes.

The council has endeavoured to carry out the wishes of members expressed at general meetings of the Branch and formulate a scheme for the protection of the incomes of those members who are on full-time service with the naval, military or air force services, and is in full sympathy with the object of the resolutions passed at the meetings. There is, however, a great deal of uncertainty regarding the commitments involved in any scheme, and although information has been sought from those members likely to call on the fund for financial assistance as to what amount will be required by them, no clear indication has been given in this direction. Moreover, the response from members who are not contributing to the "Specialists" or "Other Schemes" for contributions to the scheme suggested by the council was not encouraging, and in view of these circumstances the council reluctantly felt it was not advisable to proceed further until such time as the amount of contributions would enable the plan to be carried out successfully. It has therefore been decided to make a further appeal to members shortly for contributions in support of the fund, and it is hoped that it will meet with a generous and ready response.

#### Government Medical Appointments.

In July last the council considered the question of government medical appointments during the war. It was felt that in view of the inevitable shortage of medical men in the near future, due to extra duties in the naval, military and air force services, that if medical appointments in the public service were anticipated during the period of the war, such appointments should in the first place be for one year only, and reconsidered annually. Also that if the present occupant be still available it would be in the interests of the public to reappoint him, as he would render better service to the State so placed than in any other position. It was also felt that such action would provide a wider choice of applicants and be fairer to those members of the Branch who were away from the State on active service, and who on their return might become applicants for any government position available. The Government was approached and the views of the council placed before the Premier, stress being placed on the fact that the Government had already established a precedent by retaining the services of several public servants who had reached the retiring age. The Premier advised that it was the policy of the Government to give preference to returned soldiers, but that the services of any officer will be temporarily retained if he is in a key position and no suitable returned man is available. The men referred to were being retained as engineers engaged in war work.

#### Petrol Rationing.

The council desires to again stress the need for members to exercise the strictest oversight in the use of petrol. Members have previously been advised that the Federal Minister of Supply is very sympathetic towards the profession and realizes the need for there being no undue restriction on the professional activities of doctors. He feels, however, that more can be done in the direction of saving petrol, and asks for the cooperation of the profession in this war measure.

#### Survey of Medical Man Power.

During the year the Federal Council decided to make a survey of the medical man power in the Commonwealth, and a questionnaire was issued to members. The response



was satisfactory and the details are being tabulated and will be made available to the Federal Government, which has expressed appreciation and approval of the action of the Federal Council.

#### Honours to Members.

The council tenders its congratulations to the following members: Dr. W. A. Verco on his completion of fifty years' membership of the Association. Appreciation of the services rendered by him to the Association and profession generally has been placed on the records of the Branch. Also to Sir Trent de Crespigny, D.S.O., V.D., on the knighthood conferred on him, Major-General S. R. Burston, C.B.E., D.S.O., V.D., on his promotion to the rank of Major-General, and Surgeon-Lieutenant A. G. Campbell, R.A.N.R., on being awarded the D.S.O.

#### Appeal for Colleagues in Great Britain.

The Federal Council decided to make an appeal to members to contribute to a fund to relieve the distress brought about by the war to colleagues in Great Britain. Although we have passed through the first year of the war only, advice from England indicates that there is already much economic distress amongst members of the profession, and it was considered that the sending of financial relief by the profession in Australia would recognize in a practical way the heroism of colleagues in Great Britain in the Battle for Britain. The fund, which was inaugurated in March, will be closed about the end of June, and members who have not yet contributed are invited to do so before that date, as it is desired to make the response to the appeal worthy of the Branch. Contributions so far total £499.

#### Members Commencing Practice during the War.

The question of members commencing practice during the war has been given very full and thoughtful consideration by the council during the year, and any decision made has been reached only after every aspect of each individual case has been considered and full inquiry made. Whilst there may be disappointment felt by some whose position has been placed before the council for consideration, at the result of the inquiry, members will appreciate that the situation is at times difficult and complicated. Under the area scheme adopted by the Branch it is provided that no member should start practice during the war in areas without purchase. This provision was made to protect the interests of those members away on active service, and whilst the council does not desire to restrict the activities of members unduly, or cause hardship, it feels that the first duty is to those who are away serving their country in this time of national crisis. Each case, therefore, that comes before the council will be approached with these objects in view, and it is hoped that members will appreciate the work of the council in this direction.

#### Incorporation of the Branch.

The Branch was incorporated on the 10th day of July, 1940, under the name of The South Australian Branch of the British Medical Association, Incorporated.

#### Notices to Members.

The council desires to stress the desirability of members reading carefully the circulars sent out from time to time.

This is the regular means of communication from the council to members, and the notices contain information which it is thought necessary they should have. In the present unsettled state of affairs it is possible that advice will have to be passed on to members more frequently. The envelopes are plainly marked as coming from the Association, and members will prevent inconvenience and extra work if they will kindly make themselves familiar with the information contained in the circulars, and this will also overcome the complaint from some members that they are unaware of the work and decisions of the council.

#### Annual Dinner and Golf Tournament.

Owing to the war, it was decided not to hold the annual dinner and golf tournament this year.

#### Finance.

It will be noticed from the financial statements that there was an excess of expenditure over income of £166 7s. 6d. During the year extra expense was incurred in connexion with the legal expenses and printing of the new rules and by-laws to the amount of £232 17s. 4d., in addition to which an amount of £75 was written off against outstanding subscriptions. A further amount of £55 received as dividend from the British Medical Hall Company Limited was not taken into general revenue, but put aside as a reserve.

#### The War.

The year closes with the war showing no signs of abatement, and the British nation is still fighting to maintain those principles of freedom and justice so inherent in the character of the British throughout the world. In England the medical profession has answered the "Call of Empire" and is standing up heroically to the sacrifices brought about by the present conflict. Although Australia has so far been free from enemy aggression, no one can foresee what the future holds, but it can confidently be expected that the medical practitioners in Australia will act in accordance with the best traditions of the profession, being so nobly carried out by their colleagues in Great Britain, should such a position arise here.

The response by members of the Branch to the call of the military authorities has been good, but it is still felt that there are some who could make their services available on the Reserve of Medical Officers, thus sharing in the sacrifice necessary to prevent the burden falling on the shoulders of others, and sharing in full cooperation with the military authorities.

#### General Remarks.

This report is a brief summary only of work which has engaged the attention of the council during the year. Many other matters affecting the interests of members were dealt with, more particularly in regard to war emergency organization, which has involved many extra meetings and additional work for members of the council. A great deal of extra work has again been placed on the Lay Secretary this year, and we extend to him our sincere thanks for his help, loyalty and devotion to duty.

In conclusion, I desire to thank members of the council for their helpful and loyal support during my year as President.

(Signed) R. JOHN VERCO, President.

#### Income and Expenditure Account for Year ended December 31, 1940.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
To British Medical Association, London	545	5	6				By Subscriptions—						
„ THE MEDICAL JOURNAL OF AUSTRALIA	427	0	0				City .. .. .	1,395	7	4			
				972	5	6	Country .. .. .	484	10	4			
„ Library Subscriptions .. . . .				73	10	0	Accrued .. .. .	127	10	0			
„ Federal Council Capitation Fees ..				99	0	0					2,007	7	8
„ Postages and Telegrams .. . . .				61	0	9	„ Interest .. .. .				20	7	2
„ Stationery, Printing (including							„ Medical Certificate Books .. . .				0	6	10
£76 18s. 4d. for New Rules and							„ Balance transferred to General						
By-Laws) .. . . .				153	7	8	Fund .. . . .				166	7	6
„ Telephone .. . . .				47	13	7							
„ Rent .. . . .				47	14	0							
„ Legal Expenses (including Charges													
in connexion with New Rules and													
By-Laws, £155 19s.) .. . . .				163	6	0							
„ General Expenses .. . . .				65	3	2							
„ Salaries .. . . .				503	18	6							
„ Depreciation .. . . .				7	0	0							
„ Lister Medal .. . . .				0	10	0							
				£2,194	9	2					£2,194	9	2

## Balance Sheet as at December 31, 1940.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
To Subscriptions Paid in Advance ..			4 5 0	By Plant and Fittings .. .. .	65	2	6
.. British Medical Association,				Less Depreciation .. .. .	7	0	0
London—							58 2 6
Paid Subscriptions .. .. .	34	11	0	.. British Medical Hall Company			
Unpaid Subscriptions .. .. .	33	3	0	Limited Share Account .. .. .	2,540	0	0
			67 14 0	.. British Medical Hall Company			
.. THE MEDICAL JOURNAL OF AUSTRALIA—				Limited Current Account .. .. .	188	2	4
Paid Subscriptions .. .. .	34	0	0				2,728 2 4
Unpaid Subscriptions .. .. .	26	0	0	.. Library Account—			
			60 0 0	Delineascope .. .. .	21	10	0
.. Library Fund .. .. .	328	11	11	Projector .. .. .	30	10	0
.. Sundry Creditors .. .. .	79	14	3				52 0 0
.. National Health Insurance Con-				Less Depreciation .. .. .	8	0	0
tribution Fund .. .. .	323	17	4				44 0 0
.. British Medical Hall Dividend				.. Savings Bank Library Account ..			245 10 11
Account .. .. .	55	0	0	.. Lister Dishes and Medals .. ..			15 13 4
.. National Bank of Australasia,				.. Subscriptions Owing .. .. .			224 11 7
Limited .. .. .	13	6	2	.. Stocks—			
.. General Fund .. .. .	3,036	7	4	Hospital Forms .. .. .	0	15	7
				Medical Certificate Books .. ..	1	5	3
				Stationery .. .. .	40	0	0
							42 0 10
				.. Sundry Debtors .. .. .			38 2 1
				.. National Health Insurance Con-			
				tribution Fund—			
				Savings Bank of South Aus-			
				tralia .. .. .	23	17	4
				Commonwealth War Loan .. ..	300	0	0
							323 17 4
				.. Cash—			
				Commonwealth Savings Bank	110	16	3
				Savings Bank of South Aus-			
				tralia .. .. .	100	19	3
				In Hand .. .. .	36	19	7
							248 15 1
							13,968 16 0
							13,968 16 0

WALTER C. DOBBIE, Secretary.

P. T. S. CHERRY, Honorary Treasurer.

We hereby report:

- (1) That we have examined the Books and Accounts of the South Australian Branch of the British Medical Association, Incorporated, for the year ended December 31, 1940.
- (2) That we have received all the information and explanations we have required.
- (3) That in our opinion the above balance sheet is properly drawn up so as to exhibit a true and correct view of the affairs of the Branch as at December 31, 1940, according to the best of our information, the explanations given us, and as shown by the books produced.

Adelaide,

April 18, 1941.

MUECKE, PICKERING &amp; MITTON,

Chartered Accountants (Australia), Auditors.

## Election of Office Bearers.

The President announced that the following office bearers had been elected for the ensuing year:

President: Dr. R. J. Verco.

Vice-President: Dr. C. F. Drew.

Honorary Treasurer: Dr. P. T. S. Cherry.

Honorary Medical Secretary: Dr. John L. Hayward.

Members of Council: Dr. D. R. W. Cowan, Dr. M. Erichsen,

Dr. H. M. Jay, Dr. R. J. de N. Souter.

## President's Address.

Dr. R. J. Verco read his address (see page 406).

## Votes of Thanks.

A vote of thanks to Dr. Verco was carried on the motion of Dr. D. R. W. Cowan, seconded by Dr. R. G. Barnard.

A vote of thanks to the retiring members of the council was carried on the motion of Dr. H. M. Jay, seconded by Dr. C. Yeatman.

## Medical Societies.

## MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on August 13, 1941, at the Children's Hospital, Melbourne, Dr. H. DOUGLAS STEPHENS in the chair.

## Oxycephaly.

DR. H. DOUGLAS STEPHENS showed a boy, aged four years, with oxycephaly. He said that he had first seen the patient at the Women's Hospital shortly after the child's birth, on account of the presence of severe proptosis and slight "tower skull". He was an only child, and the birth was an easy one. Dr. Stephens had noticed the suggestion of a similar appearance in the mother's face and skull. He went on to say that the boy had always been pale, but quite active, and that while the mentality was not bad the speech was indistinct. He was a "mouth breather", and both nares were constricted to such an extent that it was difficult to pass a probe through them into the naso-pharynx. The aural meati were narrow, and at times the boy seemed to be deaf. The head projected vertically in the region of the anterior fontanelle, which had closed early. The eyes were affected by divergent squint with proptosis, and the pupils were eccentric in the corneæ towards the upper and inner aspects. The mother regarded the child as short-sighted, and reported that though he never had convulsions he frequently displayed temper tantrums. No other abnormalities were noted, such as syndactyly, which was frequently found in association with oxycephaly, or mild hydrocephalus, which was sometimes present. Dr. Stephens added that at times acrocephaly (oxycephaly) was one-sided and that he had seen an instance of actual dislocation of one eyeball onto the cheek.

At the time of the meeting the boy's weight was two stone eight pounds and the height was three feet three and three-quarter inches. Dr. Stephens reported that Dr. Robin Orr had examined the fundi and stated that the appearances were normal. Dr. Stephens showed X-ray films of the skull,

in which stenosed sutures and "digital" impressions were noticed; but there were no signs of increased intracranial tension. The urine had been examined; it usually contained phosphates, but no albumin or sugar.

Dr. Stephens said that the condition was primarily cranial, in contradistinction to microcephaly, which was central in origin. Many causes had been ascribed, such as rickets, syphilis, fetal meningitis, pituitary disturbances, venous congestion of the skull contents without inflammation, and a primary tendency to new bone formation. In the case of the boy under discussion premature union of the cranial sutures and the facial bones had occurred. The skull was shortened antero-posteriorly; the occiput was almost flat, and the superciliary ridges were small, leading to wide and shallow orbital openings with bulging of the eyes. Dr. Stephens referred to a case in which the mother and her two sisters were affected and the child had adeno-sarcoma extending into the lungs and causing death. He added that McEwen had quoted an instance of a family in which the mother and four children were oxycephalic, and commented on the familial tendency of the anomaly. The theories advanced to explain the condition were all poor, in his opinion. One of them was that the mesenchyme forming the suture lines was particularly prone to develop bone growth, causing early obliteration of the suture line. The interior of the cranium might be affected by overgrowth of the greater wings of the sphenoid bone, in a similar manner to hypertelorism, in which there was overgrowth of the lesser wings. The point to elucidate was whether progress could be stopped. On two occasions it had been reported that craniotomy to open the suture lines had been performed and had allowed of expansion of the head. Most of the patients ultimately developed pressure symptoms, and early evidence of impending optic atrophy was an indication for a decompression operation. The skull was said to be thin, but brittle, and the anomaly was not so common as might be thought. All sorts of grades occurred; if the sagittal suture closed early, the term "scaphocephaly" was applicable. Dr. Stephens felt sure that a germ plasm defect must be in operation.

#### Partial Sclerema Neonatorum.

Dr. B. R. HALLOWS showed a male baby, aged seven weeks, who had come under his care in the out-patient department one week before the meeting. The mother had noticed that when the child was fourteen days old a large confluent mass was present in the skin; it was rather purplish in colour and extended from the external occipital protuberance to the inferior angles of the scapulae and outwards to the lateral margin of the chest and onto the posterior aspects of both upper arms. The swelling was rather hard, had a slightly raised edge and could be moved over the deeper tissues. In the course of two weeks the main mass had almost disappeared, and what remained of it was situated over the shoulders and posterior aspects of the arms. The baby's temperature was normal and he seemed to be healthy in other respects.

Dr. Hallows said that he considered that the condition was an example of partial *sclerema neonatorum*, which was a rare disease. His experience of it was limited, as he had encountered only four other cases; in all the condition was generalized in distribution, and three cases had proved fatal. He hoped that the members of the society would be interested and would comment on the diagnosis and treatment.

Dr. Hallows went on to say that the condition was attributed to crystal formation in the fat cells of the subcutaneous tissues followed by cellular reaction of the trabeculae between the fat lobules for the purpose of absorbing the crystals, the fat being replaced by connective tissue. It had been suggested that changes in the fat might be due to lowering of the body temperature in debilitated subjects; but it seemed more likely that some congenital disturbance of fat metabolism or some toxic influence was causing damage to the fat cells. He referred those interested to Gray's article published in *The British Journal of Dermatology and Syphilis* in 1933.

Dr. KATE CAMPBELL referred to the confusion of terminology in conditions comparable with that affecting the patient shown by Dr. Hallows. She mentioned the classification in the text-book by Garrod, Batten and Thursfield, in which it was stipulated that in true sclerema the margin was not raised. Pseudosclerema was not associated with a subnormal temperature, and the lesion usually disintegrated, as in the case under discussion. It was ascribed to folliculitis, the result of trauma; the margin was raised and the affected area was discoloured, as in the present case. They came across all the comparable conditions among the babies at the Women's Hospital. Sclerodema affected premature babies who were undernourished; it was a hard, raised, brawny, generalized oedema accompanied by subnormal

temperature, and the treatment for it was thyroid medication and the local application of heat.

Dr. H. BOYD GRAHAM said that he was in agreement with Dr. Campbell concerning the diagnosis, but deprecated the difficulties of nomenclature; pseudosclerema was an unsatisfactory term. He referred to the necessity to include *oedema neonatorum* in the differential diagnosis; in that condition the oedema was soft and not waxy or doughy, and pitted readily on pressure.

Dr. J. W. GRIEVE said that it was not easy to separate pseudosclerema from true sclerema or to classify them with any degree of certainty.

Dr. ROBERT SOUTHEY asked Dr. Hallows whether, when labour was induced, a stomach tube was used, and whether that could have been the traumatic agent.

Dr. Hallows, in reply, admitted that the criticism of the diagnosis was just and fair. In reply to Dr. Southey he said that the method of induction of labour was that known as the "ginger" treatment at the Women's Hospital; it was a medical method without the use of a stomach tube. He went on to say that when seen in its entirety the whole of the child's back was one firm mass, and the edge was raised only in relation to the soft texture of the normal integument. He had thought of the condition known as scleroderma, but that condition occurred later in life and was never congenital.

Dr. REGINALD WEBSTER added that *sclerema neonatorum* was usually associated with a toxic factor; he clearly remembered an instance in which syphilis was the toxic factor.

#### Pathological Specimens.

##### Diaphragmatic Hernia.

Dr. REGINALD WEBSTER showed several pathological specimens, the first of which was an example of diaphragmatic hernia. Unusual features were that the congenital deficiency in the tendinous and muscular portions of the diaphragm affected the right side, and that the left lobe of the liver was included among the prolapsed viscera. Other components of the hernia were a considerable length of small intestine, the ileo-caecal junction, and a portion of the colon. The right lung was compressed and rode above the herniated viscera; the heart was displaced to the left. The prolapse of the intestine through the hiatus, which was exceptionally large, had evidently resulted in traction upon the duodenum, as the stomach was much dilated. Gastric stasis had in fact been demonstrated by Dr. Colin Macdonald in the radiological examination which established the diagnosis.

Dr. Webster remarked with reference to diaphragmatic hernia in general that, apart from traumatic factors, the protrusion usually took place through one or other of the natural openings in the diaphragm, particularly that for the oesophagus, or through a congenital deficiency in the muscle. As a rule the viscera involved were the stomach, colon and small intestine, which were prolapsed into the left side of the thorax. The museum at the hospital contained several examples of diaphragmatic hernia, all of the more common left-sided type. Hitherto Dr. Webster had not acquired a specimen which displayed the defect on the right side.

##### Malignant Disease of the Ovary.

Dr. Webster went on to discuss a specimen secured at the autopsy on a girl, aged five years, who had been presented by Dr. J. W. Grieve at the July meeting of the society and had died in the interval. He did not recapitulate the clinical features, which had been such as to gain general acceptance for the diagnosis of neuroblastoma. The conspicuous feature of the specimen was the presence of bilateral ovarian tumours, generally ovoid in shape and 10 to 12 centimetres in the longer axis; the growths were of smooth and somewhat lobulated surface and hemorrhagic in cross-section, and among the darker portions were lobules and islands of pallid fleshy tissue. It was apparent from the examination of microscopic sections that much of the neoplastic tissue was necrotic. The Fallopian tube on the right side was much enlarged, indurated and permeated by malignant tissue. Prominent at the autopsy was a large retroperitoneal tumour mass, which extended from the lumbosacral region over the surface of the right kidney, to engulf and obliterate the adrenal gland on that side. There was no enlargement of the liver; that viscus showed no neoplastic permeation or nodular metastases such as would be expected in the "Pepper" type of neuroblastoma. Dr. Webster had not performed the autopsy, but had watched it carried out by Dr. Howard Williams. They had not been able to ascertain whether the metastatic nodules in the scalp, so suggestive clinically of the "Hutchinsonian" skull tumours of neuroblastoma, were actually bony metastases, as they had been obliged by restrictions imposed by the child's parents to limit the autopsy to the thorax and abdomen.



Dr. Webster said that in the approach to the pathology of bilateral ovarian tumours it was always to be borne in mind that they were much more frequently metastases of some inconspicuous and clinically unobtrusive primary growth, than indigenous and "primary" ovarian neoplasms. The most familiar examples of bilateral ovarian metastases taking clinical and anatomical precedence over more or less concealed growths, which stood to them in the relation of progenitors, were the "Krukenberg" tumours. The *fons et origo* of the Krukenberg tumours were most frequently an easily overlooked carcinoma of the stomach, less often a carcinoma of the gall-bladder or small intestine, and rarely a carcinoma of the breast. The Krukenberg tumours were characterized by a distinctive histological pattern, in which the identifying features were clumps and columns of "signet-ring" epithelial cells, set in a cellular and oedematous stroma. The "signet-ring" appearance of the epithelial cells was due to the intracellular presence of mucus, which flattened the nucleus and crowded it to one side.

Microscopic sections prepared from the infiltrated Fallopian tube and from one of the ovarian tumours showed a homogeneous small round-celled structure, with many thin-walled blood vessels; such differentiation as was present seemed to be towards connective tissue. In any retroperitoneal small round-celled growth in infants and young children neuroblastoma called for first consideration; but Dr. Webster had been unable to detect any "rosette" formation or immature nerve fibres. The appearances he had described were those of the small round-celled sarcoma, and the question for decision was whether the ovarian tumours had arisen from the retroperitoneal mass, by transcoelomic implantation in the manner of the Krukenberg tumours, or represented a primary bilateral ovarian malignant condition, of the nature of round-celled sarcoma. Ewing recognized the occurrence of round-celled sarcoma of the ovary in children and young subjects, and observed that it proved rapidly fatal. He described it as an ill-defined and rare form of tumour, which might be single or—of particular interest in the case under discussion—bilateral. Such tumours attained a considerable size, were usually solid, and contained softened or necrotic areas. The microscopic structure was that of small round cells, lying diffusely or grouped about thin-walled vessels; the structure offered no clue to the histogenesis.

Dr. Webster observed that Ewing's description of round-celled sarcoma as it occurred in the ovary was applicable to the specimen he had shown with respect to both gross anatomy and histological features. If the tumours were regarded as bilateral ovarian sarcomata, retroperitoneal lymph gland metastasis had also to be accepted. Lymph-nodal deposits from sarcomata other than those of lymphoid tissue itself and rhabdomyosarcomata were rare; but it appeared from recent literature that the rule under which early propagation of carcinomata was by lymph channels and that of sarcomata by the blood stream had not the fixed and immutable character of the law of the Medes and Persians, which altered not. S. Warren and R. W. Meyer had discussed the subject in 1938 in the September issue of *The American Journal of Pathology*. Of 237 cases of sarcoma observed by these authors, a series from which lymphosarcomata, sarcomata derived from the endometrial stroma, and melanotic sarcomata were excluded, in 17 (or 7%) metastases were proved to be present in lymph glands. In conclusion, Dr. Webster said that he would present the specimen as one of bilateral ovarian sarcoma, although he recognized that such an interpretation was debatable. There was always the possibility that the neoplasms represented a malignant metaplasia of connective tissue components of a teratoma.

DR. H. DOUGLAS STEPHENS, from the chair, congratulated Dr. Webster on the preparation and mounting of the specimens and on his interesting and instructive commentary.

## Correspondence.

### CHANGES IN THE LUNGS IN VARIOUS INDUSTRIES.

SIR: It has been a thankless task educating Dr. J. G. Edwards in the industrial hygiene of the dust diseases of the lung, but with his discovery of a primer on silicosis the prospect brightens. It has always been my simple idea that before leaving the art of radiology, in which he has a reputation, for the science of industrial hygiene, where he is practically unknown, he should read the literature of the dust diseases. He should not miss "Silicosis and Asbestosis", edited by Lanza, 1938, a much better book for most purposes

than his primer, Amor's "Atlas of Silicosis"; then follows the I.L.O. Silicosis Conference, Geneva, 1940, whence he may proceed to the literature generally. In this way he could become the "Compleat Listerian Orator" in dust diseases. He must get out of the dangerous habit of trying to deal with facts with gibes; this has resulted from a primitive trait derived through the Guild of Daguerreotypists. I am afraid that ridicule will always be too delicate a thing for him to handle. And so to our muttons.

In my letter in your issue of August 30 I expressed no opinions apart from stating that the Adelaide oration was generally inaccurate and a pious hope that the grace which had reached Dr. Edwards in the matter of emphysema might be continued as regards the separation of silicosis and tuberculosis. The facts on which I stated the Adelaide audience was misinformed are:

- (1) Toxicity of minerals containing free silica.
- (2) Incidence of silicosis at Broken Hill.
- (3) Stone dusting of New South Wales coal mines.
- (4) Percentage of silica in coal in New South Wales.
- (5) Workers' compensation for dust diseases.

In reply, Dr. Edwards refers me to "An Atlas of Silicosis" by Amor, which he says will probably displease me, as it bears out opinions published in his address. This book naturally makes no reference to the New South Wales conditions numbers 2 to 5. Its statement that the higher the silica content the greater the risk is derived from the Chief Inspector of Factories report and concerns men using sandstone and quartz. It is not for general application, as Dr. Edwards thinks; it has been recognized as erroneous since the Johannesburg Conference in 1930. Will Dr. Edwards meet these facts or will he scuttle?

In a charitable mood Dr. Edwards accuses me of possessing only theoretical experience, for this must surely be one of my minor faults. In the past eighteen years I have examined at least the 800 coal miners dealt with by his practical man. I have dust sampled the majority of the mines and industries of this State and have examined pathologically 145 lungs of men more or less affected by dust, and all these have been chemically analysed by my colleague Brigadier H. B. Taylor, Australian Imperial Force.

If Dr. Edwards cares to publish an Australian atlas of dust diseases of the lung I can let him have 78 cases complete with lungs, X rays, full pathological reports and chemical analyses, while his practical man offers him 66 cases with the incomplete pathology of not more than 20 and no chemical analyses.

This offer must be construed as the attitude of a modern Canterbury Clerk and not as a reconstruction of radiological crime. However, as my physical powers are waning I will accept his advice and lead a practical existence, it seems easier.

In your issue of August 23 appears a review of Amor's "Atlas of Silicosis"; this is a useful publication for those who require an atlas. It contains a careful and fairly accurate synopsis of the literature, but is weak in pathology and has no chemical analysis, both of which are demanded of a modern atlas.

Your reviewer distorts and misquotes several sentences and such misstatements and overstatements as the following are out of place in a review. "At present the subject is scattered through various medical and industrial publications and is difficult of access." Here your reviewer ignores "Silicosis and Asbestosis", edited by Lanza, 1938, Oxford University Press—in many ways a much better book for the medical practitioner than Amor's atlas.

"In conclusion, the work is by far the most important yet published." As an atlas, that prepared for the Johannesburg Conference, 1930, edited by Irvine, Steuart, Simson and Strachan is much superior, while the silicosis figures of Lanza are not far behind and his asbestosis figures are better.

Your reviewer whose errors reveal his identity to those used to his inaccuracies writes: "The author lays it down that the only substances which produce the typical changes in the lungs are silica and various silicates contained in asbestos." Amor writes: "such as quartz . . . and a few dusts in which the silica is combined with bases as silicates, of which the varieties of asbestos are the most important". Later on he qualifies this "From a practical point of view".

Your reviewer writes: "Unfortunately it is not possible to estimate scientifically the 'safe' concentration of dust, and all dust counts and estimates are only approximate." Amor says no such thing; he writes: "Again, in the case of mixed dusts, the proportion of the dangerous constituents actually present in the dust cloud can be determined only approximately by petrological methods."

Your reviewer writes: "The size of particles generally accepted as dangerous range up to 10 microns for silica and up to 200 for asbestos. Such particles are invisible to the naked eye, and a room which shows little dust to the

naked eye may contain a dangerous collection of harmful particles. Once again it is stressed that the higher the silica content, the greater the hazard." The faults here are that particles of 200 microns are visible to the naked eye, that a room which shows no dust may contain a dangerous collection of harmful particles, and that it is incorrect to say the higher the silica content the greater the hazard. Here your critic has followed Amor's error.

Yours, etc.,

Department of Health,  
Sydney,  
September 22, 1941.

CHARLES BADHAM.

SIR: I have read Dr. Badham's letter and I think that readers will gather from its tone why I refuse to waste time answering any criticisms by its author.

Yours, etc.,

"Craignish",  
185, Macquarie Street,  
Sydney.  
October 3, 1941.

J. G. EDWARDS.

[This correspondence is now closed.—EDITOR.]

#### A NATIONAL MEDICAL SERVICE.

SIR: I would like to applaud through the columns of the journal the warning given and the opinions expressed by Dr. Maude in the issue of September 20, 1941. It is generally admitted that nationalization, to some extent at least, of medical services is certain to occur in the near future. It is to be hoped that the profession will not only be ready to accept the scheme when the time comes, but will also play its part in assisting in the post-war reconstruction by offering a concrete scheme to the authorities for general adoption throughout the Commonwealth. During a recent visit abroad I was informed in Canada that Australia's social service and industrial conditions were held in high esteem in Canada. If industrial legislation has brought working conditions in Australian industry to such a high level as to merit the esteem and approbation from abroad, is it not just as important that public health should be placed on an equally high standard? Although it has long been admitted, and indeed Dr. Lipscomb affirms the fact in his letter of the last issue, that the standard of medical practice in this country is exceptionally high, yet the relations between the general public and the profession as a whole have not reached that level of cooperation which exists between individual members of the profession and their immediate patients. The present appears to be an opportunity whereby this relationship can be placed on a sound and cordial basis. It will, I think, be admitted that the very large majority of the profession are actuated by sufficiently high ideals as to regard their vocation as something more than a livelihood, and that they endeavour to render true and faithful service to the public, often without any remuneration. This state of affairs is present in all branches of the profession, from the Macquarie Street specialists to the humblest country general practitioner. Cannot, therefore, the profession as a whole rise to the high level of its component members, relinquish some of its mercenary instinct and offer a scheme which will be within the reach of the public and sufficiently practicable for the government to enforce? The present and future are going to see the end of the unrestricted profit making. Taxation and compulsory loans will make vast inroads on all incomes, and this will not end with the war. The national medical service will have the advantage of removing the greatest bugbear of medical practice, the collection of fees, and thus removing one of the main causes of disagreement and distrust on the part of the public. In addition it will provide the public with the opportunity of obtaining medical advice and treatment in the early stages of an illness. Thus many disabling illnesses will be checked before they reach the stage when frequent medical attention is necessary. It is a well-known fact that whereas lodge patients will attend in the early stages of an illness, private patients frequently postpone the seeking of advice, because of the expense entailed, until the disease is well established.

Any scheme which will be worth universal support will have to provide an inclusive medical service and will have to give the patient on the moderate income the same facilities for medical diagnosis and treatment as is available to the very wealthy and the very poor. It is therefore important that the scheme should contain facilities for X-ray and pathological examination.

I hope that the articles which have been published in the journal of recent months, and Dr. Maude's letter, will

stimulate considerable interest and correspondence and will encourage the profession to apply itself with intelligence and understanding to this problem, which is certain to arise in the very near future.

Yours, etc.,

KEITH J. B. DAVIS.

The Bungalow,  
Marius Street,  
Tamworth,  
New South Wales.  
September 26, 1941.

#### THYREOTOXICOSIS.

SIR: In the September 20 issue of your journal we find three papers on thyreotoxicosis and its treatment. From reading these articles it would seem that we had learnt nothing new in the last twenty-five years. We are given the assurance that the cause of this condition is unknown, with the consequence that nobody makes any effort to find it out. Within the last few years it has been stated that the death rate from toxic goitre in England has doubled since the indiscriminate use of iodine in these cases. All agree that the acini in toxic goitre are empty, but have they considered the reason why? The same question can be applied to the colloidal goitres showing signs of myxoedema. There is a definite state of rigidity of colloid which is available for use. If it is too thin it will not remain in the acini, and if too thick it cannot be utilized. The one produces thyreotoxicosis, the other myxoedema. I have suggested that a correct combination of calcium with iodine was the factor which governed the rigidity of the colloid, but there should surely be some young worker with sufficient enthusiasm to find out this point for certain. Some few years ago, when Lord Horder and Sir Thomas Dunhill were out here at a medical congress, Mr. Poate took much trouble to try to show how infections could have nothing to do with goitre, and he showed on the screen some photos of cases which had had various focal infections removed, with apparently no result. The cases had had tonsils removed, teeth extracted and even a gall-bladder removed as well as antra drained. I pointed out at the time that operations on antra do not necessarily remove infection, especially if other sinuses are also infected. Having during the last thirty years treated and cured great numbers of these cases, my experience has shown that there has been an infection present in every case, and where that infection has been completely removed, as can be done with tonsils, teeth and gall-bladders, thyreotoxic symptoms disappear completely. Sinus infection is the one difficult factor to deal with.

On page 314 Mr. Poate says: "In the chronic or secondary conditions colloid may be present, but it is locked in the acini by diffuse fibrosis, chiefly perilobular, and often round-cell infiltration is seen, changes which are indicative of low-grade inflammatory reaction." Does not this low-grade inflammatory reaction speak for itself? Now of all the medical men practising in Australia there must be some besides myself who have seen thyreotoxic goitre clear up with the removal of an infection. It is up to them to quote their cases and disprove the imputation that the cause of thyreotoxicosis is not known. There are thousands of cases seen in every out-patient department with the three cardinal symptoms of thyreotoxicosis—nervousness, tachycardia and tremor—who have no thyreoid enlargement, yet who get quite well on having some focus removed. These symptoms are, after all, those of hypersympathetic activity. Calcium and not iodine has been the factor which has proved most beneficial in my practice. In fact, iodine is reserved for subthyreoid conditions. In toxic goitre the iodine within the colloid will not stay put, it is used up quicker than it can be supplied, hence the temporary benefit of its use. Intramuscular injections of colloidal calcium thicken the colloid and so help the retention of the iodine. The reverse is seen in the colloidal goitres of the myxoedemic types; iodine is useful in liquefying the colloid and so allows it to pass into the circulation, with the disappearance of the goitre. There can be no other solution to the subsidence of the goitres. In the whole realm of medicine there is no fact easier to demonstrate than that toxic goitre is due to infection. I have never seen a recurrence of symptoms where foci have been completely removed; but I have where the focus has been in sinuses, as even if treatment is successful at the time there is a liability to a return at some future date. A little while ago I had the following letter:

Dear Dr.: It is twenty years since you successfully treated me for goitre. If you can recall after so long, my goitre was very bad when I came to you. It was exophthalmic and far advanced. It has been quite right ever since till the last week or two. There is absolutely no enlargement of the thyreoid gland (as far as I can

judge) and apart from weary legs I do not seem to be in bad health, but my right eye is definitely getting larger . . .

On seeing this patient I found she had had a bad cold which had stirred up old sinus infection, and which, together with some household worries, had caused thyrotoxic symptoms to reappear. Even where adenomata are present I cannot recall ever having seen a flare-up except with the recurrence of the infection. With blood-borne organisms circulating through the tissues, it would be foolish to assume that the thyroid gland was the only part of the body immune from invasion at some time or other.

Yours, etc.,

Bullarat,  
Victoria,  
September 26, 1941.

SYDNEY PERN.

## Naval, Military and Air Force.

### APPOINTMENTS.

THE undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 193, of September 25, 1941.

#### NAVAL FORCES OF THE COMMONWEALTH.

##### Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

*Fixing Rates of Pay.*—Surgeon Lieutenant Leo John Harrison to be paid the rates of pay and allowances prescribed in the Naval Financial Regulations for Surgeon Lieutenant-Commander (on promotion), whilst acting in that rank, dated 16th July, 1941.

##### Citizen Naval Forces of the Commonwealth.

###### Royal Australian Naval Reserve.

*Appointments.*—Ian Campbell Galbraith and John Malcolm Gaskell are appointed Surgeon Lieutenants, dated 21st August, 1941, and 28th August, 1941, respectively.

#### AUSTRALIAN IMPERIAL FORCE.

##### Australian Army Medical Corps.

The undermentioned officers are transferred from Reinforcements from the dates shown: Captains J. F. Connell, 25th May, 1940, and W. R. Gayton and C. J. Gibson, 22nd April, 1941.

*To be Lieutenant-Colonels.*—Major C. K. Parkinson, M.C., 17th July, 1941, Captain W. S. Dawson, 11th August, 1941, and Captain (Honorary Major) J. Gray, 17th July, 1941.

*To be Majors.*—Captains (Temporary Majors) T. P. Crankshaw and A. D. Frost, 1st August, 1941, Alan Stoller, 11th August, 1941, and Honorary Captain B. A. Hunt and Howard Hadfield Eddes, 18th August, 1941.

*To be Captains.*—Captains J. W. Best, 25th August, 1941, and D. C. C. Hinder and D. Watson, 1st August, 1941, Honorary Captains C. R. Boyce, E. B. Drevermann, J. F. F. Drew, C. P. Juttner and G. M. Crabbe, 1st August, 1941, and E. D. Hull, 12th August, 1941.

*To be Captains.*—Captains G. D. Cumming, L. R. Israel, C. C. Wark, R. A. Douglas, S. C. Barrett, W. K. Manning, T. M. Clouston, I. S. Booth, C. E. Marshall and J. L. D. Scott and Honorary Captain J. C. Yeatman, 1st August, 1941, Honorary Captains A. J. M. White, 22nd August, 1941, M. J. M. Lapin, 25th August, 1941, D. R. Reid, T. K. S. Whiting, H. B. Gatenby, S. G. Mallarky, B. R. Morey, K. W. Locke and R. S. Stafford, 1st August, 1941.

Captain H. Shannon is transferred to the Permanent Supernumerary List, 6th August, 1941.

Captain (Temporary Major) W. A. Russell is transferred from Reinforcements and to be Major, 4th August, 1941.

Captain E. P. Hennessy is transferred from Reinforcements, 12th August, 1941.

*To be Majors (temporarily).*—Captains G. Kaye, 19th July, 1941, and E. W. Casey, 8th July, 1941.

Captain K. B. Brown ceases to be seconded in his unit in the Australian Military Forces, 31st August, 1941, and resumes duty in his unit in the Australian Military Forces, 1st September, 1941.

##### Permanent Supernumerary List.

The undermentioned officers are transferred from the Australian Army Medical Corps from the dates shown: Captains N. F. Fremantle, 7th July, 1941, and J. S. Stewart, 14th July, 1941, and Lieutenant F. D. Blumer, 16th July, 1941.

#### AUSTRALIAN MILITARY FORCES.

##### AUSTRALIAN ARMY MEDICAL CORPS.

###### Northern Command.

###### First Military District.

Honorary Captain B. L. W. Clarke is appointed from the Reserve of Officers (A.A.M.C.) and to be Captain (provisionally), with regimental seniority next after Captain (provisionally) G. W. Allen, 7th August, 1941.

*To be Honorary Captains.*—Ernest Bruce-Smith and William John Arnold, 22nd August, 1941; and Norman Vincent Youngman, 25th August, 1941.

###### Eastern Command.

###### Second Military District.

The provisional appointment of Captain N77160 J. S. F. McKee is confirmed.

Captain (provisionally) W. G. H. Epps is transferred to the Reserve of Officers (A.A.M.C.), 14th August, 1941.

The resignation of Captain (provisionally) R. E. S. Charlton of his commission is accepted, 7th August, 1941.

*To be Captains (provisionally).*—Vincent Harcourt Vernon, 17th August, 1940 (in lieu of the notifications respecting this officer which appeared in Executive Minutes Nos. 227/1940 and 14/1941, promulgated in *Commonwealth Gazette* Nos. 248 of 1940 and 20 of 1941 respectively), Reginald George Wright, 26th July, 1940 (in lieu of the notifications respecting this officer which appeared in Executive Minutes Nos. 235/1940 and 28/1941, promulgated in *Commonwealth Gazette* Nos. 1 of 1941 and 31 of 1941, respectively), Eric Douglas Hull, 22nd July, 1941 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 156/1941, promulgated in *Commonwealth Gazette* No. 173 of 1941), and Frederick Osborne Bushby Wilkinson, 22nd August, 1941.

###### Southern Command.

###### Third Military District.

*To be Honorary Captain.*—Colin Noel De Garis, 1st August, 1941.

###### Fourth Military District.

*To be Honorary Captains.*—Neil Daniel Crosby and Luke Everard Verco, 25th August, 1941.

###### Western Command.

###### Fifth Military District.

The following officers are appointed from the Reserve of Officers (A.A.M.C.) and to be Captains (provisionally): Honorary Captains C. Georgeff, C. W. A. J. Schlink, and A. Breckler, 21st August, 1941.

*To be Captains (provisionally).*—Hilda Burn Kershaw and Aileen Mary Murphy, 21st August, 1941.

*To be Honorary Captains.*—Alexander Thurston Watson and Eccles Norman Nash, 25th August, 1941.

#### ROYAL AUSTRALIAN AIR FORCE.

##### Citizen Air Force: Medical Branch.

The following are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: Lionel Chase Stinton, 26th August, 1941; John Bareham Cahill, M.B., B.S., Gordon Roberts, M.B., Ch.B., B.Sc., 1st September, 1941.

The following Flight Lieutenants are transferred from the Reserve to the Active List with effect from 1st September, 1941: A. J. M. Dobson, T. W. Vorrath.

Temporary Squadron Leader B. A. Hunt relinquishes his commission with effect from 18th August, 1941.

The following are appointed to commissions on probation with the rank of Flight Lieutenant with effect from the dates indicated: Douglas Arthur Carter M.B., B.S., 9th June, 1941; James Joseph Rice, M.B., B.S., 11th August, 1941.

Flight Lieutenant F. H. Lord is transferred from the Reserve to the Active List with effect from 18th August, 1941.—(Ex. Min. No. 139—Approved 24th September, 1941.)

##### Reserve: Medical Branch.

The following are appointed to commissions on probation with the rank of Flight Lieutenant with effect from 1st September, 1941: Thomas William Capell, M.B., B.S., Denis Francis O'Brien, M.B., B.S., F.R.C.S., Louis James Lawrence Price, M.B., B.S.—(Ex. Min. No. 138—Approved 24th September, 1941.)

### CASUALTIES.

ACCORDING to the casualty list received on October 1, 1941, Major J. D. Palandri, A.A.M.C., of Mount Lawley, Western Australia, Captain M. Mayrhofer, A.A.M.C., of Merredin, Western Australia, and Captain W. W. Gunther, A.A.M.C., of Sydney, New South Wales, previously reported missing, are now reported prisoners of war.



### MILITARY CERTIFICATION.

We have been asked by the Secretary of the Standing Committee of Services' Medical Directors to publish the following warning:

It has been brought under the notice of the Services' Medical Directors that medical certificates are being given to members of the forces by some medical practitioners without due regard to the circumstances.

Any certificate given for the purpose of securing an extension of leave for a sailor, soldier or airman of His Majesty's Forces or as a reason for his absence from duty must be strictly in relation to the condition of health of the member of the forces the certificate is intended to affect.

Medical certificates should on no account be given until examination has satisfied the doctor giving them that their issue is warranted on medical grounds.

### Notice.

THE New South Wales Post-Graduate Committee in Medicine announces that the next library seminar arranged by the Post-Graduate Directors of Medicine, Surgery and Pathology will be held at the Prince Henry Hospital, Little Bay, New South Wales, on Monday, October 13, 1941, at 4.30 p.m. The subjects will be: (a) "The Effect of Crush Injuries on the Kidney", (b) "Anuria". A cordial invitation to be present is extended to all medical practitioners.

### Corrigendum.

We regret that an error has occurred in the article by Dr. H. R. G. Poate, entitled "The Technique of Subfascial Thyroidectomy", in the issue of September 20, 1941. The legends to Figures XV and XVI, reproduced on page 321, have been transposed. We apologize to Dr. Poate for this mistake.

### Australian Medical Board Proceedings.

#### QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Act, 1939*, of Queensland, as duly qualified medical practitioners:

Moore, Geoffrey Henry, M.B., B.S., 1936 (Univ. Sydney), General Hospital, Townsville.

Wyse, Elice Hutchinson, M.B., B.S., 1939 (Univ. Sydney), Department of Health and Home Affairs, Brisbane.

### Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Windeyer, John Spencer, M.B., B.S., 1941 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

Blacket, Ralph Beattie, M.B., B.S., 1941 (Univ. Sydney), 105, The Avenue, Hurstville.

Marshall, Charles Edward, M.B., 1940 (Univ. Sydney), 12, Fairfax Road, Bellevue Hill.

Sullivan, John Francis, M.B., B.S., 1939 (Univ. Sydney), NX12279, Captain, A.A.M.C., R.M.O. 2/17 Battalion, Australian Imperial Force, Abroad.

The undermentioned has applied for election as a member of the South Australian Branch of the British Medical Association:

Goode, Phillip Charles Ryall, M.B., B.S., 1940 (Univ. Adelaide), Price Avenue, Lower Mitcham.

The undermentioned have been elected members of the South Australian Branch of the British Medical Association:

Stokes, John Lewis, M.B., B.S., 1941 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

Hill, John Symon Thew Tregarthen, M.B., B.S., 1941 (Univ. Adelaide), Royal Adelaide Hospital, Adelaide.

The undermentioned have applied for election as members of the Tasmanian Branch of the British Medical Association:

Klineberg, David, M.B., B.S., 1936 (Univ. Sydney), Rosebery.

Kelly, Kenneth Melville, M.B., B.S., 1940 (Univ. Melbourne), 174, Macquarie Street, Hobart.

### Diary for the Month.

Oct. 14.—Tasmanian Branch, B.M.A.: Branch.  
Oct. 15.—Western Australian Branch, B.M.A.: Branch.  
Oct. 22.—Victorian Branch, B.M.A.: Council.  
Oct. 24.—Queensland Branch, B.M.A.: Council.  
Oct. 30.—New South Wales Branch, B.M.A.: Branch.  
Oct. 30.—South Australian Branch, B.M.A.: Branch.  
Oct. 31.—Tasmanian Branch, B.M.A.: Council.  
Nov. 5.—Western Australian Branch, B.M.A.: Council.  
Nov. 5.—Victorian Branch, B.M.A.: Branch.  
Nov. 6.—South Australian Branch, B.M.A.: Council.  
Nov. 7.—Queensland Branch, B.M.A.: Branch.  
Nov. 11.—Tasmanian Branch, B.M.A.: Branch.  
Nov. 14.—Queensland Branch, B.M.A.: Council.  
Nov. 19.—Western Australian Branch, B.M.A.: Branch.  
Nov. 26.—Victorian Branch, B.M.A.: Council.  
Nov. 27.—New South Wales Branch, B.M.A.: Branch.

### Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

**New South Wales Branch** (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

**Victorian Branch** (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

**Queensland Branch** (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

**South Australian Branch** (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

**Western Australian Branch** (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia.

### Editorial Notices.

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